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COTTON

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WATER TRANSPORTATION IN THE SOUTHERN STATES.

The industrial resources and development of the Southern States demand increased facilities of transportation from the sources of supply to points of distribution or consumption, at a low cost. The commerce of the world depends upon its growth and maintenance to the means of carrying products of the farm or factory, by land, river or sea, at a small cost, or charge over the value of the commodity at the initial point of shipment. While this applies in this country to all sections, it is of specially vital importance to the South contiguous to the Gulf of Mexico, in its commercial relations to the opportunities that will be furnished by the Panama canal in bringing its agricultural and manufactured products into the channels of trade with the people living on the Pacific coasts, whether in South America, or the Archipelagos, the Orient, or our own States beyond the Rocky mountains. Among the manufactures of this section those of cotton do now and will hereafter figure in the exports from the interior points where made through the isthmian canal, via the seaboard ports, to the nations beyond, where an immense trade awaits us if we are disposed to take advantage of it. But what benefits one industry receives benefits all, and in turn the communities dependent upon their prosperity, and whether it be the raw material or the manufactured product the inter-relation is so paramount that what is to the advantage of the one is also to that of the other to the extent, at least, of enriching the commonwealth and stimulating the activities and commercial aggressiveness of all vocations, be they connected with the soil, the mine, the factory, the shop, the bank, or means of traffic.

The inland waterways of the South are not of secondary importance to the benefits to accrue from the opening of the Panama project, as additional means of traffic that will be required to meet the necessities of developing commerce with the outside world that stands ready to give preference to the products that are identified with Southern enterprise and opportunity, which are dependent on facilities of quick and reliable transportation. These waterways have, also, more than a sectional importance as possessing elements of national significance touching the trade of the north and middle west, and inciting that of all other parts, making the commerce of the whole nation contingent for its satisfactory progress upon national support as can be afforded by the material assistance of congress as coming within its constitutional powers to regulate interstate and foreign commerce in all of its details. In this respect, it becomes incumbent upon the national government to exercise its jurisdiction for the good of all, according to some uniform and consistent plan that will encourage and exalt our industrial advantages, and develop our natural resources. There should be a liberal but discriminating national policy of waterway improvements co-ordinate with our railway systems which are not now nor ever can be sufficient to satisfy the requirements of trade, especially in the movement of heavy or bulky freight.

Our great waterways are the natural highways of the nation. They belong to the people and cannot be dominated by the monopolistic greed of corporations. They are the regulators of freight rates on means of transportation, and to this extent our industries are the beneficiaries, the healthy growth of which are participated in by all people either directly or indirectly. Collateral with any improvements that may be made in the waterways,—streams or canals,—are corresponding improvements in the harbors that serve as convenient points of transshipment of merchandise to foreign marts. Therefore, as a commercial factor for the extension of trade that is before us just as soon as the isthmian canal is completed, is the betterment of our gulf harbors to allow the passage of vessels of the largest size and draft that may seek the commerce of the ports that may concentrate there.

Fortunately for the project of a consistent and continued policy being instituted by congress is the growing sentiment among legislators representing public views, that there must be inaugurated a well devised plan for national support of a general scheme for improving the internal and foreign commerce of the country by increased developments of the means of transportation that our harbors and waterways are conducive to. For example, the river and harbor bill of 1882 that was passed appropriating $20,000,000 over a veto of the president, unseated one or two scores of congressmen when they again appeared before their constituents for re-election, yet a year ago a bill carrying an appropriation more than three times as large was passed, as expressive of public opinion, without criticism.

There should be co-operation among States in congress and severally in promoting a feasible scheme with engineering approval, for connecting and making available the streams of the country for purposes of navigation from the interior to the Gulf and Atlantic ports, and by this means carrying the sea to the inland points where manufacturing is conducted and agriculture is carried on. The South is particularly concerned in any scheme that may be suggested or adopted, if for no other reason than that no other section of the country is blessed with so many navigable rivers, or capable of being made such at a comparatively small cost, with no engineering difficulties to contend with for necessary connections.

With the possibilities that lie in the proper development of the waterways of the South for commercial purposes, this section is in its infancy, with a future before it that exceeds the vision of prognostication. With a cotton crop of twelve to fifteen million bales a year, to supply three-fourths or more of the world's demand, a corn crop one-fifth the size of that of the whole country, a coal production one-fifth of the entire bituminous output of all the States, and with nearly the whole of the national product of phosphate rock, and with large yields of wheat, oats and other products of agriculture, besides what is furnished by the great textile, iron, and other manufacturing industries that have already taken leading positions in the productive wealth of the country, the South cannot and must not show the least spirit of indifference to any practicable plan that will further her commercial and industrial importance as dependent on facilities of transportation, toward which well-constructed railroads have very materially contributed to the extent of 65,000 miles, but which are inadequate to meet the demands of the business situation even as it now presents itself. What is needed is to make cheap freight connections of the inland shipping points of the South direct with the ocean traffic that leads to all parts of the world, as well as to our own seaboard points along the upper Atlantic and Pacific oceans.

The commercial status of the South is one of most rapid growth, as exhibited in that section bordering on the Gulf of Mexico, from whose ports the export trade is increasing more rapidly than from those on the Atlantic. The increasing value of the export trade of the Gulf ports, as derived from the central States south of the great lakes and the upper waters of the Mississippi river, is exhibited in the port returns of 1897 and 1907, which for the former year amounted to 181 million dollars against 433 million dollars for the latter year, a gain of nearly 140 per cent. The import values for the same period rose from 18 million dollars to 62 million dollars.

TEACHING THE GRADING OF COTTON.

There is in vogue in the cotton growing States, of late, a disposition on the part of those in touch with the educational needs of cotton planters to furnish expert instruction concerning the production and classification of the staple in relation to trade requirements, so that the grower shall have an intelligent idea of what he should do and know, for his own profit and protection against the machinations of unscrupulous persons who are ready to take advantage of his ignorance of even the ordinary points of trade. The schools that have been instituted for this purpose have had but a limited time for demonstrating their usefulness, and appreciation by those for whose benefit they are intended. Their success must necessarily depend chiefly on the competency of those who instruct, both in the matter of knowing and how to impart their knowledge to the understanding of the learner. The difficulty in this respect will not lie so much in securing a goodly number to attend classes of instruction as in obtaining men of suitable qualifications for the work in hand, especially those who will be willing to give their time gratuitously, or practically so. As at present planned, the course of instruction will be of short duration, to consist of lectures and practical demonstrations in such things as the grading and classification of cotton, and particulars for planters to consider in the cultivation of the staple to meet the necessities of spinners. The grading of cotton may be easily taught but it is not easily acquired, as its acquisition depends upon the quickness of the eye, and its long and continued training to detect the nice distinctions existing between approximate grades. The longest course in grading proposed is for thirty days, and while this may be all that is necessary to get an understanding of how it should be done, it would be a great assumption upon the part of the student to pose as an expert on the amount of learning obtained within this time, or expect to be accepted as such in any mercantile transaction, to the satisfaction of the spinner, or even to any one, involving the loan of money upon the value of cotton. For the planter's satisfaction, to be improved by experience, the school's tuition can be turned to advantage, as well as for those who desire to follow the cotton business.

Inquiries about anything pertaining to the textile business will be cheerfully answered by COTTON.

CUSTOMS TARIFF REVISION.

A revision of the customs tariff law by congress is not far distant, and the probabilities are that something will be done in this direction before the close of the present congress, either in the way of a new act or formalities that will eventuate thereto at the succeeding session. The present law was enacted in 1897, and has, therefore, been in operation without the slightest change ever since, a history in tariff legislation which is remarkable for its longevity, and commendatory of the care and intelligence that was exercised at the time of its consideration in relation to the requirements of our industries and the needs of our national finances at that period and since. The tariff of 1897 has long been admitted to be the most scientific and even balanced law ever placed in our statutes for the protection of our industries with the least oppression upon the people. It has been a witness of the greatest commercial development of our resources and opportunities that has ever occurred in our national progress, characterized by an increase in the country's wealth from 80 million dollars to 115 million dollars, or nearly 44 per cent., or per capita from $11.50 to $13.20. The law has been the least criticised for inequalities or unfairness of any that has been enacted in modern times, or since 1865, when the nation took on a new life of industrial existence. A ten-year duration of a tariff is about as long as can be expected of it for conforming to the changes that are experienced in the mutations of trade, especially when they are influenced and promoted by rapid and mighty innovations such as have been seen within the last decade as the results of new discoveries and inventions.

The first movement that has been made toward a tariff revision is for the establishment of a permanent commission composed of those who are familiar with the peculiar needs of our diversified industries in their domestic and foreign relations affecting the general welfare of an enlightened people. The creation of such a commission has been proposed in congress, largely along lines recommended by the National Association of Manufacturers, of a non-partisan character having in view "the intelligent, thorough, and unprejudiced study of facts, the development and enlargement of our foreign trade, the accomplishment of this by reciprocal trade agreements, based on maximum and minimum schedules; and the adjustment of the tariff schedules so that they shall affect all interests favorably and equitably, without excessive or needless protection to any." As will be seen, these suggestions, however tentative they may be regarded, point to very much lower rates of duty than those now existing, on a basis that will furnish sufficient latitude of application as will permit reciprocity arrangements with foreign countries for an interchange of commodities that are the products of one or the other.

In itself, the creation of a permanent tariff commission may not be a menace to our domestic manufactures, as much, if not everything, depends on its personnel and the business proclivities of its members, and in the abstract it may be favorably looked upon as a body of experts familiar with the economic and practical phases of the subject matter with which they are charged to consider, and upon which they are to advise congress what to do for the best interests of all concerned; for it is well known that it can act only in an advisory capacity, as congress cannot delegate its legislative duties to others, and so jealous are its members of their constitutional rights, especially those entrusted with committee responsibilities on tariff matters, that it may be doubted if unsolicited advice, or that partaking of anything obligatory, would be conducive to the best results. Congressmen are swayed in their actions by the supposed sentiments of their constituents, as they relate to their business wants and views, and as a rule they do not gracefully submit to proffered advice from a body of men clothed with advisory powers of a coercive nature.

About the worst and most impotent tariff that was ever enacted was that of 1883, which succeeded the appointment and recommendations of a tariff commission of supposed experts, but which, however, was framed without any consideration for this commission's recommendations, which were regarded, even by the commission itself, as incongruous. On the other hand, the best tariff that has ever been constructed on scientific principles in conformity with business needs was that of 1897, without the aid of any commission empowered to give advice. Whether the rates of duty were the most advisable is a distinct question, but there can be no controversy concerning its methods of classification and structure as being far superior to anything of the kind ever before enacted. We may speak with special emphasis affecting the textile schedules, and that relating to cotton manufactures cannot be very well improved.

The present law referring to textile manufactures has not been difficult of interpretation, as its provisions are clearly enunciated expressive of the intent of congress and of those in whose interests it was framed, in contrast with that pertaining to previous tariffs. In only a few instances have controversies arisen regarding the meaning of the law, either in its purpose or the principles of legal construction, as defined by the decisions of the courts. The structural application of that paragraph in the cotton manufacturing schedule relating to fancy fabrics like lappets, was at first in dispute, as might have been expected, because it introduced a new feature in a tariff on cotton manufactures to cover the changes that were being made toward a finer and more ornamental line of fabrics that our mills were going on to in competition with similar goods made in Europe. This paragraph is now interpreted by customs appraisers and the courts, in conformity with the objects of those who were instrumental in having it incorporated into the law, and, probably, would not be changed were the tariff revised, unless it be in the rates of duty imposed. The flax schedule has been remarkably free from impediments, and no changes are invited regarding it. The same can be said of the wool and manufactures of wool schedule, in that none of its provisions has been pressingly controverted, in conspicuous contrast with preceding tariffs under which this schedule was the chief arena for hot contests. If there is any exception to this, it is found in the construction of a provision in the silk schedule relating to manufactures of which wool is a component material, to be classified and assessed for duty as manufactures of wool, which ordinarily means at a higher rate of duty. This provision of relegating such manufactures to the woolen schedule has recently been decided by the United States Circuit Court of Appeals favorably to woolen manufacturers, notwithstanding the adverse decisions of the U. S. Board of Appraisers.

We do not believe that the industrial prosperity can rightfully be traced entirely to a protective or any other kind of tariff on foreign imports, but when this country is

in the enjoyment of prosperity, a properly adjusted customs tariff against foreign competition gives our manufacturers the home market, and domestic competition, as affecting much the greater portion of business enterprises, regulates values of commodities onto an equitable basis to consumers.

Under the 1897 tariff act there is no tangible evidence that the internal or external commerce of the United States has suffered, but on the contrary it has exhibited no restraining effect, and any argument made to show this in the use of statistics or by the course of trade is imaginary and based on illusions that cannot be substantiated, or construed in conformity to facts. If it is alleged that our foreign trade could have been augmented by entering into agreements of a reciprocatory character with other nations, the reasons therefor are purely speculative, and lack fundamental support. Within the life of the present law, the export values of our domestic commodities have increased nearly 80 per cent., a magnificent exhibition of commercial progress in our trade with the outside world. Within this period, our exports of crude materials for use in manufacturing have increased 100 per cent. in value, supplying to this extent the demands of our foreign competitors in manufactures, who have also taken 171 per cent. more of our partially manufactured products for further use in their manufactures to swell their domestic or foreign trade. In addition, we have shipped abroad 125 per cent. more manufactures ready for consumption. Surely this is a brilliant record in our commercial relations with other nations that are supplied with the wealth of our industries as derived from the soil or produced from the activities of our factories. If it is desirable to increase our export trade, and no one will try to dispute this, let it not be forgotten that we have also our own industries and home trade to protect, as paramount to any consideration that may advance the material welfare of those who reside outside of our realm. We have within our own political jurisdiction practically forty-eight nations, between which there exists the utmost freedom of trade, many of which are larger in territory, and in productive and consuming potentiality, than any of the principal manufacturing States of Europe.

TEXTILES IN GERMANY.

In Dusseldorf immediately after leaving school, usually at 14 years, the young girls enter the factories. In two years they earn from 35.7 cents to 47.6 cents a day, and after four or five years their wages are increased to the maximum of 83.3 cents. In weaving mills the salary undergoes many fluctuations, reaching as high as $1.19 per day. There are also many factories where workers are paid according to what they produce, and often make as much as $1.30 a day.

In Glauchau complicated novelties are made. The old staff of hand weavers are people of great technical knowledge, and all of the help, such as spinners, dyers, and finishers, have adapted themselves to producing novelties to overcome almost any difficulty in the way of new creations. Furthermore, Glauchau has a state weaving school, with some very practical and experienced teachers, so that there is always a supply of technically educated help. In fact, men, women and children are imbued with everything that is connected with weaving goods.

Chemnitz is a great manufacturing center. The cotton goods, especially stockings, for which the place is mainly celebrated, rival those of England in quality and cheapness. It is also famous for the manufacture of spinning machinery. There are numerous establishments for the weaving of woolen and half woolen cloths, and the stocking weaving is prosecuted by a large number of firms. The dye works, paint works, bleach works, and chemical works employ a great number of workmen and carry on a large trade.

Hundreds of thousand dozens of knit gloves are purchased in Chemnitz annually by buyers from every country in the world. In the surrounding district the ceaseless noise of the knitting machine is heard in every home. The export trade is very extensive. The principal articles of exports for the United States consist of underwear, machinery, hosiery (cotton, silk, wool), and gloves (cotton, silk, wool).

The great prosperity of the Chemnitz hosiery trade is largely due to the good demand manifested by the United States. Lisle-thread goods, of which a dozen of ladies' stockings only weigh 1¼ pounds, are becoming largely sought. As regards fancy styles, lace openwork goods still lead in this market, and there is also a large demand for hand embroidery on hosiery. Kid gloves are largely manufactured, but this particular line has been affected by the popularity of silk and lace gloves. Golf and Scotch gloves are also a popular feature of this market. In laces the demand is good for guipures, nets, and galloons. Another important line is that of dress fabrics, such as jacquards, serges, armures, and grenats. The trade in upholstery goods, plushes, etc., is also in a flourishing condition.

Germany has almost obtained a monopoly in the cotton knit goods trade in the United States, the exports thither amounting to $6,150,484 in 1905, $7,128,897 in 1906, and $8,671,848 in 1907. The principal supply for these goods is Chemnitz. The number of spindles in Saxony has increased from 740,000 to 1,430,000 in twelve years. The total in the German Empire is now 10,000,000.

THE NATIONAL ASSOCIATION OF COTTON MANUFACTURERS.

The 84th annual meeting of the National Association of Cotton Manufacturers will be held at Huntington Hall of the Massachusetts Institute of Technology, Boston, Mass., on Thursday and Friday, April 16 and 17. A detailed notice will be issued to the members on April 1st.

Among the subjects already arranged for this meeting will be the following: Arts of Weaving and Spinning, Cotton Cultivation in West Africa, Cotton Mill Stocks as Investments, Egyptian Cotton, Improvements in the Cotton Fibre from Storage of Seed Cotton, Lubrication Tests in Cotton Mills, Need and Advantages of a Cotton Exchange in New England, Sea Island Cotton, Steadying Power of Consolidation, Steam Turbins, What a Manufacturer Should Know About Coal, and Yarn Testing.

The judicious holding of cotton is an essential factor and probably the most important factor in the proper marketing of the crop.

Future trading in cotton is a beneficial and sustaining and broadening factor in marketing the crop, because it is in effect an insurance policy protecting those who handle both the actual cotton and the manufactured product.

SEA ISLAND COTTON.

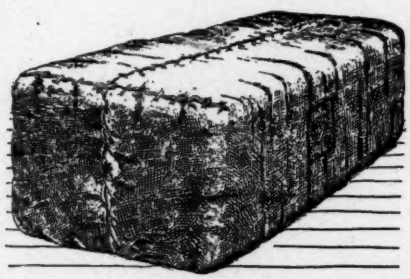
Seed Selection—System of Baling—Classification of Cotton—Factors Governing Prices—Egyptian Cotton Competing with Sea Island.

BY W. A. ORTON.

Pathologist, Bureau of Plant Industry, U. S. Department of Agriculture.

(Concluded from February.)

South Carolina Sea Island cotton is put up in bags, 7½ feet long and about 2½ feet in diameter, containing 300 to 400 pounds. They are filled by hand and pressed in a light hand-screw press. Compression for export is not practiced.



The upper picture is a Bag of Carolina-grown Sea Island cotton, showing the style of package used on the Sea Island.

The lower picture is a Bale of interior-grown Sea Island cotton, showing the style of package used in Georgia and Florida.

In the Charleston district the finest cotton is that grown by a limited number of planters who have for many years paid the most careful attention to seed selection. Their cotton is not only long and fine but is picked with so much regard to cleanliness and iniformity that the grower's private brand on the package is often sufficient guarantee of its quality.

These fine "crop lots" comprise about 35 per cent. of the cotton marketed in Charleston and sell for from 30 to 60 cents a pound. They are all exported. The demand for this extra-fine and high-priced cotton is very limited. The remainder of the South Carolina crop is sold in the usual manner at lower prices. The higher price secured for South Carolina cotton is largely because of its superior preparation—all stained, and weak cotton and bits of leaf being removed before baling.

Interior Sea Island cotton is packed by a steam press into bales weighing about 400 pounds each, of the same shape and size as an upland cotton bale, 54 inches by 27 inches. They are covered with heavy burlap, secured by sewing with strong cord instead of by the steel ties used on bales of the upland cotton.

Buyers classify interior cotton first by length of staple into "East Floridas," 1¾ inches to 2 inches; "Floridas," 1⅝ inches to 1¾ inches; and "Georgias," 1⅝ inches but less fine than Floridas. These names have come to be applied without regard to the source of the cotton. The length of staple is mainly influenced by seed selection, but in part by the character of the soil. Each of these classes is subdivided into grades with reference to its preparation and appearance, the usual grades being fancy, extra choice, choice, extra fine, fine, and "dogs." The difference of 5 to 10 cents a pound between fancy and fine shows the possible gain to the farmer from careful preparation. Loss of grade is due to exposure to weather before picking, to storing or ginning when too wet, and especially to the presence of stained or yellow cotton and bits of leaf or other trash.

There is a fairly uniform demand for a few hundred bags of extra-fine cotton with staple of 2 inches and over, and, for what the market requires, a high price, 50 to 80 cents a pound, will be paid. A larger quantity of this long-staple cotton is difficult to sell at any price. For the medium grades (1⅝ inches to 1⅞ inches) there is a liberal demand at prices determined by the law of supply and demand. The size of the crop in Georgia and Florida is the principal factor in establishing the price, but other long staples exercise considerable influence.

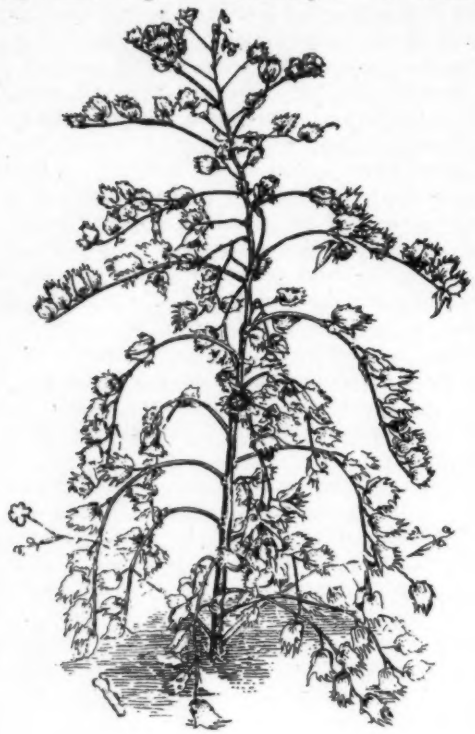
Staples less than 1-5/8 inches long sell well only in a year when the long-staple upland crop is inferior. This long-staple upland cotton is grown mainly in the Mississippi Valley, and as it can be produced at a less cost than Sea Island cotton it is evident that the latter must not be permitted to become less than 1⅝ inches in length, in order to avoid this competition.

The next quality of staple competing with Sea Island cotton is the Egyptian. Egyptian, while not as long and fine as Sea Island cotton, is very strong and free from waste, owing to careful preparation. It wastes in the mill nine per cent. less than Sea Island cotton, the average wastes in the different processes of preparing for spinning being 33 per cent. for the Sea Island and only 25 per cent. for Egyptian. Much of the Egyptian cotton is decidedly shorter than Sea Island, but the Jannovitch variety, and to some extent the Abassi, are, in particular, competitors of Sea Island of 1-5/8 inch staple or less, and will continue to be used in preference to the American product, even in our own mills, until the interior Sea Island growers improve their product.

Jannovitch has, during the last few seasons, commanded practically as much money as "extra choice" and "fancy Georgias." If, however, we could produce cotton with a staple of 1-5/8 inches which would not show a spinning loss of more than 25 per cent. as compared with 33 per cent., the present average loss, and if at the same time we could grow a cotton with fewer neps, there would be a tremendous expansion in the demand for this style of cotton, for the

reason that it is slightly stronger than Jannovitch; but as the case stands now, Jannovitch is preferred at an even price in many cases on account of its being less wasty and having fewer neps.

The Egyptian, although closely related to Sea Island cotton, cannot be grown successfully in our Southeastern



The upper picture is an ideal form of cotton plant. The leaves have been removed to show manner of branching.

The lower picture is a double roller used on the Sea Islands to prepare the beds for planting cotton. The strips of wood mark the location of the hills.

States on account of its susceptibility to the bacterial disease "black-arm."

Sea Island cotton produced in the West Indies is equal to the average American product, and indeed competes with the Carolina Sea Island cotton rather than with the interior product. The West Indian industry is new, having been developed mainly since 1902, and is as yet of small proportions, only about 4,000 bales per annum being produced; but the industry there may grow rapidly. It has already led the South Carolina planters to organize in refusing to sell seed.

Interior planters are advised not to aim to produce an extra long cotton. South Carolina and the West Indies can excel in this, and the market for such cotton is very limited. Furthermore, the increase in length is obtained at a sacrifice in yield which cancels the profit. Rather let the interior grower select for a staple 1⅝ inches to 1¾ inches long and for a vigorous and productive plant, and let the campaign for a reduction of acreage be directed against staples less than 1⅝ inches in length and against the planting of upland cotton in Sea Island districts.

Without seed selection Sea Island cotton cannot be grown successfully for more than a few years in any latitude. The interior growers have always depended on the skillful seed selection of the Carolina planters and have continued to neglect the matter since this seed supply has been cut off by a growers' organization. No more improved seed can be had from the Sea Islands, and nothing is more certain than that the crop will continue to deteriorate rapidly until the interior growers begin work to improve it.

COTTON BILLS OF LADING.

The following circular has been issued by the Chairman of the Committee of the Bill of Lading Conference, dated Liverpool, January 31.

Practically all the Savannah shipowners and agents have come in, and in Galveston only a few names are still left out. New Orleans shipowners and agents have so far not been approached, because consignees of goods via that port are protected by the law of Louisiana, as will be seen by the following extract of a letter from the President of the New Orleans Cotton Exchange to the President of the Liverpool Cotton Association:

"The complaint of the bankers is directed towards the dangerous practice prevailing at other ports, of issuing a port bill of lading, against cotton in the interior. This practice is not permitted by the laws of this State, and does not prevail at this port. Foreign shipments from the interior are covered by through bills of lading issued by the railroad company, and the liability of the latter does not cease until the consignment is delivered to the ship. Upon the actual delivery of the consignment to the ship, the latter issues a master's receipt which is attached to the through bill, and is evidence that the ship has actually received the cotton. No port bill of lading is issued here unless the cotton is actually in port, and delivered to the vessel."

So much for the present state of affairs. With regard to the future the committee has repeatedly been asked what steps it proposes to take to keep the reform effective. The answer to this has to deal with two points, viz.:

1. The alleged danger of any one of the consenting parties breaking faith. This danger is only imaginary, for recent experience has taught that competitors would immediately inform the committee of such a breach of agreement, and to the defaulter the consequences would be disastrous.

2. Keeping the list *a jour*, i. e., to make it complete and keep it so. Changes and amalgamations take place and new firms are founded, and alterations and additions in the list will therefore be continually necessary. To overcome this difficulty the Liverpool Clearing Bankers have passed the following resolution:

"While adhering to previous resolutions the members of the Association of Liverpool Clearing Bankers, at the re-

quest of the committee of the bill of lading conference, 1907, resolve that they will only accept or make advances against cotton bills of lading issued by shipowners and or agents who have consented or may in future consent to the conference resolutions."

This resolution will make it incumbent upon the individual shipowners and agents engaged in the cotton trade to take the necessary steps to have their names entered on the official list of consenting shipowners and agents, by writing to the chairman of the bill of lading conference committee, Cotton Exchange, Liverpool, that they consent to issue only cotton bills of lading in conformity with the Conference 1907 terms, viz.:

"A through bill of lading so drawn as to establish the continuity of responsibility of the several carriers from the interior point to the ultimate European or other foreign destination—or

"A port bill of lading duly signed on behalf of the steamer by the captain or other authorized agent after receipt of the goods into the custody of such captain or other authorized agent at the port of shipment.

OUR TEXTILE SCHOOLS.

Necessity of Engineering Courses.

BY FREDERIC DANNERTH.

A quarter of a century ago our filter manufacturers would have done a slim business among the textile mills. In those days when good water for industrial purposes could as a rule be obtained without much trouble from creeks and streams and nearby mountains, the bleacher and dyer did not grow gray hairs wondering what he was going to do with the lime which his water contained. Rapid strides in textile manufacturing, where, in some cases, a million gallons of water are demanded daily, have compelled our mill owners to look to artesian wells for their supply or else be satisfied with the muddy water of the streams. All this brought with it the problem of hard and muddy waters which is engaging the attention of our engineers at the present day. The outcome of all has been the introduction of an array of water-purifying apparatus constructed on various principles, which vary with the use to which the water is to be put.

In the spinning room the old-fashioned method of moistening the floor with a watering can or the distribution of the water by means of pails and vapor pots has given way to more rational methods of humidification. Skilled engineers have studied the theory and practice of air-moistening with the result that we now have a great variety of apparatus at our disposal while the humidity in the various departments is observed by means of carefully constructed hygrometers. Thus the atmospheric conditions existing in the Lanchasire and Bolton districts of England have been duplicated, so that the conditions which we *naturally* have during May and June are *artificially* extended through the whole year.

Another problem which has been discussed very largely and which is of growing importance is ventilation. Although every mill should make a study of this subject for the benefit of its operatives, it becomes a prime necessity in the dye-house. During the summer months the warm air is capable of retaining a considerable amount of moisture without appearing cloudy. Thus air at 90° F. can hold 14.8 grains of water per cubic foot while at 10° F. it can hold but 0.8 grains. This explains why the dye-house is filled with dense clouds of condensed steam during the cold winter months. To obviate this disagreeable condition various schemes of ventilation by means of blowers and fans have been proposed.

A fourth application of engineering to the needs of the textile industry is to be seen in the drying machines which are now a part of every complete modern dye-house. Twenty-five years ago dyed yarns and wet finished fabrics were almost universally dried in the open air on wooden frames or in winter time the goods were hung in the drying loft. This was of necessity a slow method so that increased business soon compelled our manufacturers to look to some quicker means of removing the moisture from the goods. The modern dehydrating machine has the advantage that it can be set up in any part of the mill, it dries the material quickly and uniformly and is above all independent of climatic conditions.

The textile chemist should furthermore become especcially familiar with the machines peculiar to the dye and bleach-house such as machines for dyeing stock, yarn, piece goods and cops; bleaching kiers (high and low pressure and vacuum appartus); machines for mercerizing wool-scouring, carbonizing and calico printing; tom-toms, hydro-extractors and hydraulic presses.

For the textile chemist who aspires to the position of manager of a print-works or similar plant, an accurate knowledge of the principles upon which these machines are based, is well nigh indispensable. Thus, for example, his knowledge of the chemical technology of the mercerizing process is of little value unless supplemented by an acquaintance with the machines used in the process. A man thus equipped will be in a position to work *with* the superintendent while his less fortunate brother must needs work *under* him.

REINFORCING CONCRETE COLUMNS AND BEAMS.

In accordance with the present plan the reinforcement of the concrete comprises longitudinal members in combination with other reinforcing members which have substantially a V-shape or U-shape in cross section with the edges of the legs or sides of the members secured to the longitudinals.

In the drawings there are shown several ways in which the proposed method may be embodied.

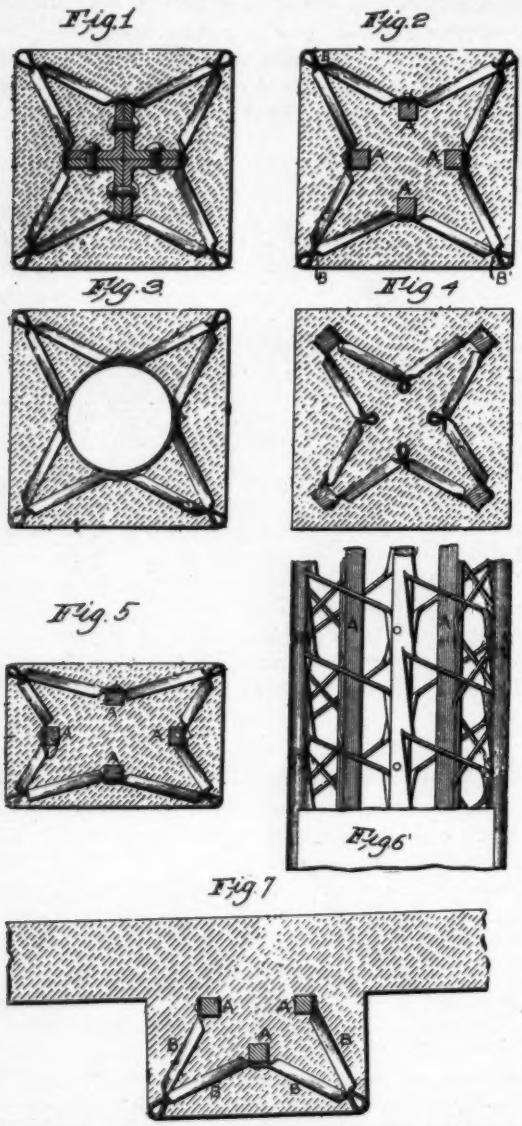
Figures 1, 2, 3, 4 and 5 are cross sectional views of reinforced concrete columns showing different forms proposed. Fig. 6 is a side view of the reinforcement shown in Fig. 2. Fig. 7 is a sectional view of a beam embodying the scheme.

In Fig. 2 the longitudinals are shown at A, and they may be of any suitable shape in cross section and of any suitable construction and are arranged in the column to extend longitudinally thereof. The other reinforcing element is designated by B, and as shown it is substantially V-shape in cross section with the edges of the sides secured to the longitudinals by any suitable means. This V-shaped reinforcing member may be an expanded metal member, or a built up structure.

This manner of making the reinforcing member results in a member which has a continuous apex or edge and also

continuous side edges, the apex and side edges being connected by bars. Where the apex of the V-shaped reinforcing members are exposed at the corners of the column, as shown in Fig. 2, the apex acts to protect the corners of the column and prevent them from being shipped or broken.

Furthermore, since these apices are exposed in the completed column, it is possible to use them for supporting the false work or form, within which the concrete column is made, and thus it is not necessary to use so elaborate a construction for supporting the form as is necessary where such form cannot be supported on the reinforcing elements of the column itself. This construction has the further advantage that a column or beam thus formed can be transported without danger of the corners of the column becoming chipped or broken. This construction, therefore, enables one to build portable columns or beams.



In Fig. 1 there is shown a construction similar to that shown in Fig. 2, except that a central longitudinal reinforcing member or core is shown. Where the form such as shown in Fig. 1 is used in a building, the angle-iron longitudinal members may have sufficient strength so that they may be used to support the false work necessary to mold the concrete structure. This method of use, it is claimed, involves a great saving of time and labor, and lessens very much the risk of accident which is always incidental to structures which are used temporarily as is the false work in a concrete building.

In Fig. 3 there is shown still another form of the scheme in which the longitudinal member is tabular, the edges of the V-shaped reinforcing members being riveted or secured to the tubular member.

In Fig. 4 there is shown a way of embodying the reinforcing members in a column according to which the V-shaped members are arranged with their apices directed inwardly instead of outwardly. In this form no metal is exposed at the corner of the column for protecting the latter, but the benefit of the truss-like V-shaped reinforcing members is secured and also the benefit of the longitudinal reinforcing members.

In Fig. 5 there is shown an embodiment of the scheme similar to that shown in Fig. 2, except the column is oblong in shape instead of square. This may be secured by making the two sides of the V-shaped reinforcing element of different lengths. In other respects the embodiment is like that shown in Fig. 2 with the edges of the V-shaped reinforcing member secured to the longitudinals.

In Fig. 7 there is shown how the scheme may be embodied in a beam. It is usually the under side of a beam which is subjected to tension and which needs the strength derived from the reinforcement, and in embodying the scheme in a beam, therefore it is proposed to use only two of the V-shaped reinforcing elements or the elements which would be used in one side of a square column and to place these two elements so that they will properly reinforce the lower side of the beam, and if placed so that the edges are exposed they will also protect the corners of the beam.

REINFORCED CONCRETE FOR COTTON MILLS.

BY M. GOLDENBERG,
Member American Society of Civil Engineers.

Reinforced concrete has now been used to such an extent by textile manufacturers as to make its advantages no longer the subject of speculation. The Hockanum and Minterburn Mills at Rockville, Conn., the Eagle Spinning Mills at Hamilton, Ont., the Botany Worsted Mills at Passaic, N. J., the Arnold Print Works, at North Adams, Mass., are examples of this construction.

Mr. Upson, chief engineer for the Hockanum Company, in speaking of the considerations which led to the adoption of the system of reinforced concrete in preference to other building methods, gives two vital reasons: First, absolute protection against incapacitation of the plant on account of fire. Second, rigidity of construction, making all the floors available for any type of woolen manufacturing machinery. He also gives as another consideration the suitability of reinforced concrete construction to wide spans and heavy floor loads, which are necessary for the proper location of machinery, and the possibility of carrying on building operations quite independent of the stringency of the skilled labor market.

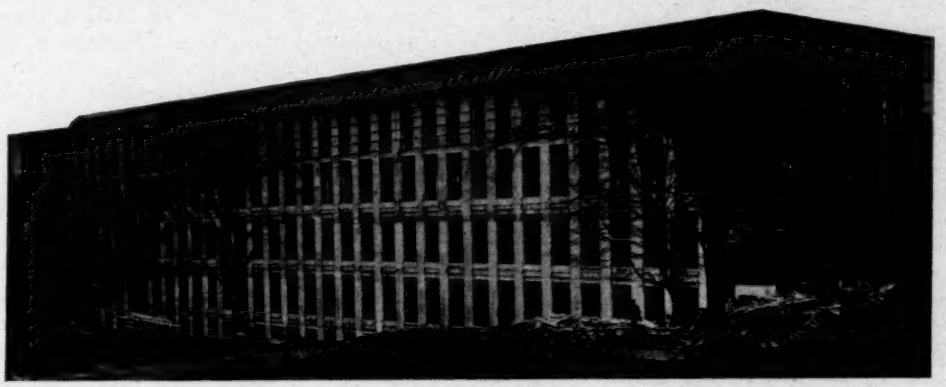
As certain woolen manufacturing machinery must be free from vibration, concrete construction is found especially advantageous in this class of building, the heavy masses of concrete completely absorbing the shock from the machines. This freedom from vibration has also been thoroughly demonstrated in the use of reinforced concrete in many of the largest printing plants.

The question of fire protection is one which appeals to every owner and investor. Speaking on the subject of reinforced concrete from the standpoint of fire protection, Julius Kahn, president of the Trussed Steel Concrete Company, of Detroit, Mich., and inventor of the numerous well-known devices for the reinforcing of concrete, gives some interesting facts from the field which he has done so much to develop. He says:

"It cannot be doubted that reinforced concrete is the solution of the building problems which arise, not only from the increasing price of lumber and the diminishing supply, but from the demands for greater protection to property from loss by fire and the wear of time. We have passed from the stage of the pioneer, where any kind of a structure was good enough, to a stage where the builder looks to the future and plans buildings that endure, buildings that fulfill all the requirements of comfort, safety and economy, not only in the original first cost, but in the cost of maintenance, insurance rates, light and sanitation. In concrete we are again bringing into use material used by the ancients in their most enduring monuments and buildings, which still delight and attract the traveler; and with the introduction of reinforcing steel we have a material which can be handled by engineers and architects in a manner to thoroughly meet modern requirements. Reinforced concrete has been 'tried by fire,' and all evidence points to but one conclusion, namely, that when properly handled it is the most effective fire-resisting material known. The Kahn trussed bar, because of its truss action when imbedded in the concrete, has a main winged member from which diagonals are sheared at intervals and bent up at an angle of 45 degrees. These diagonals resist the stresses, carrying them into the main member. The whys and wherefores of this are readily understood by the engineer, but do not interest people in general except in the actual results. When, however, it comes to a question of fire resistance and concrete as a fireproof material, it is easily made clear to the lay reader how the trussed bar plays an important part. When a beam, girder or slab is made, the reinforcing bars are placed in from one to two inches of concrete underneath the diagonals extending up into the mass. In the event of a fire of sufficient intensity to affect the concrete, at the most only the outer surface will be affected. Suppose, for example, the bottom layers are caused to crumble through the action of fire, it is practically impossible to destroy more than the outer layer. If the main bar is exposed, the prongs will remain imbedded in the main mass of the concrete, and the strength of the mass, which is still many times greater than when laid by reason of the fact that concrete increases in strength with age, will still perform its work and the affected part can be replaced at small expense."

The above statements made by Mr. Kahn are fully verified by the report of the United States Geographical Survey on the San Francisco fire.

The Minterburn Mills, mentioned above, are devoted to the manufacture of woolen and worsted goods. The main building is 58 by 294 feet, five stories high. The entire building—footings, columns, girders, beams, floors, roof and walls—is of concrete, reinforced with the Kahn trussed bar. The concrete pilasters between windows are 7 feet 6 inches on center, and each one supports a floor beam. The columns of the row down the center dividing the building into two bays are 15 feet on center. Intermediate beams span 29 feet from wall to center girder and columns. Between these beams is the 4½-inch solid concrete floor slab. The low curtain walls under the windows and the wall panels at the end of the building are solid concrete. The wall at the end is built around a stairway. All the stairways in the building are completely enclosed by fire walls, and all openings are provided with automatic fire doors so that each floor is entirely separated from the others. With this protective system the entire contents of one floor might burn without damaging the stock or machinery in the rest of the building. Adjoining the main building are two other buildings—the dye house, 39 by 66 feet, and the engine and boiler house, 50 by 78 feet. The dye house has a perfectly clear floor, as the beams which support the 6-inch solid concrete roof slab span from wall to wall, 39 feet clear. These beams are 15 feet apart. A monitor running the full length of the building rests on them. The boiler house is divided into two rooms—the engine room, 50 by 30 feet 6 inches, and the boiler room, 50 by 47 feet. Both of these



THE MINTERBURN MILLS, ROCKVILLE, CONN.

rooms have unbroken floor areas, the engine room roof beams spanning across the 30-foot 6-inch way, while in the boiler room the beams span 50 feet from outside wall to outside wall. The great advantage of large, clear floor space areas in buildings of this kind, especially in engine rooms, is apparent, as engines, pumps, etc., may be placed anywhere on the floor without regard to the limitations of the structure. When it is remembered that this building, permanent and fireproof, was erected in only 70 days, the revolution in construction which reinforced concrete has brought is more forcibly emphasized than ever.

The advantages of reinforced concrete may be briefly summed up as follows:

Its cost is from 20 to 35 per cent. less than the ordinary building with brick walls, and of the structural steel fireproof construction. The excess over wood mill construction is from 10 to 12 per cent. Its resistance to fire has been proved by numerous tests made for the Building Department of New York City, as well as by actual results of fires such as the disasters in Baltimore, Toronto and San Francisco. It is unaffected by atmospheric conditions, or gases and acids in the air. The nature of concrete is similar to stone, with the additional advantage that it protects the reinforcing steel imbedded in same. It can be made to take any form, making possible any desired architectural effects. It is monolithic in character when incorporated in any structure, and therefore any accidental or sudden loading coming upon the same will be distributed and act as a cushion to relieve immediate stresses that are liable to occur. It is easy to imbed shaft hanger inserts and anchors while pouring the concrete, thus facilitating the fastening of machinery to floors and ceilings. Its rapidity of construction is owing to the fact that most of the material necessary can be obtained on the site. There is no delay waiting for shop work and labor troubles are minimized.

The spinning industry is enormous at Lille, France. Many fortunes have been made there spinning the thread for Calais, Caudry, and St. Quentin. Much thread also is imported from England. Merchants have, even in Calais, grown rich in furnishing lace manufacturers with thread.

TINCTORIAL PROPERTIES OF MERCERIZED COTTON.

According to recent investigations the characteristic tinctorial properties of mercerized cotton are due, not to any particular advance in the affinity of cellulose itself, but rather to the removal of obstructions present in the raw or merely bleached fiber.

These obstructions are presented by the waxy constituent of outer cuticle and the dried layer of protoplasm covering the inner walls of the fiber, substances which possess considerable affinity both to basics and direct colors, and which, moreover, are permeated with difficulty only. These obstructions resist the usual bleaching routine and the incidental treatment with alkali to a considerable degree, whilst they are successfully removed by immersion in caustic soda of mercerizing strength, the cellulose part of the fiber thus being bared to the action of the dye liquor.

Topically, the same effect as by strong alkali is produced by cupro-ammonium, which reagent does not dissolve, but partially detaches, the covering referred to. In a substantive dye-bath the portions of the fiber thus bared take a deep shade; the unaffected parts are but lightly stained.

Supported as it may be by microscopical evidence, from the practical standpoint the rather one-sided theory here advanced in a measure refutes itself, since incrustations acting as mordants and keeping the dyestuff on the surface would cause the raw fiber to take deeper shades with the same amount of coloring matter than the one "purified" by mercerization.—*E. C. Kayser in Textile Recorder.*

FIXING LUSTER ON COTTON FABRICS.

It is claimed that a good and permanent luster is produced on cotton fabrics by first giving a high finish by calendering under great pressure and at a high temperature, and then fixing the luster at the expense of a slight diminution of its intensity. This is done by immersing the goods in cold water or sprinkling them with it, or by washing them with soap.

An impartial judgment will concede to the majority of employers the honorable title of fair-dealing, benevolent men.

COTTON MANUFACTURING

THE RING SPINNING PROCESS.

The Production of the Ring Frame on Course Yarn is Greater than that of the Mule, but less on Very Fine Yarn—Setting of the Rolls—The Draft.

BY STEPHEN E. SMITH.

At the present time there are two forms of spinning machines in extensive use; namely, the ring frame and the mule. Among the advantages of the ring frame are the following:

(1) Greater production per spindle.
(2) More spindles in a given area.
(3) Cheaper help.

As regards the increased production per spindle it will be found greater in the production of coarse yarns than on fine yarns, and if the comparison is carried to very fine yarns the advantage in production per spindle will be in favor of the mule. The point where the mule takes the lead in amount produced cannot be definitely fixed, but is probably somewhere in the vicinity of number 150 or 200 yarn. An important factor which influences the relative production of the two machines is the amount of twist in the yarn.

On account of its being possible to spin and wind yarn on a mule with less tension than on a ring frame there is often an advantage in favor of the mule when making soft twisted yarns even of the coarser numbers.

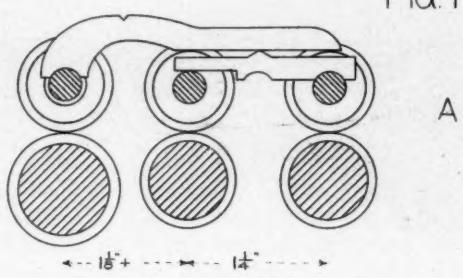
As regards the area occupied per spindle by each

machine the following figures are given. In giving their estimates a mule of 1¼ gauge has been compared with a ring frame of 2½ space it being assumed that both are for spinning filling.

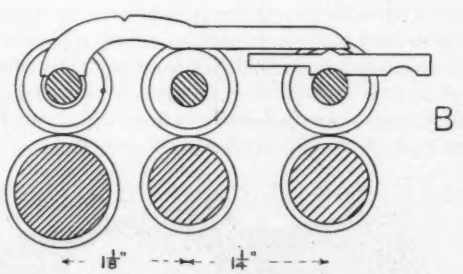
A mule of 800 spindles and a frame of 224 spindles have been chosen. A pair of these 800-spindle mules would occupy an area 88′-7″ by 20-8 or in other words 1,600 spindles would occupy 1,830 square feet or 1.14 square feet per spindle This, of course, includes no allowance for alleys, but considers only the space occupied by the machine.

A ring frame of 224 spindles occupies a space of 25′-6″ long by 3′-0″ wide or 76.5 square feet which gives .34 square feet of floor per spindle as the space occupied by the frame alone. Making liberal allowance for side and end alleys it would be possible to put 9 frames in the same space occupied by the above mules, and these nine frames would aggregate 2,016 spindles.

FIG. 1



SETTING FOR 1⅛" COTTON.



SAME ROLLS ADAPTED FOR 1½" COTTON.

Assuming both machines to be producing number 40 yarn, the following number of pounds would be obtained per 10 hours.

Mule spindles, .119 lbs. × 1600=190.4 lbs.

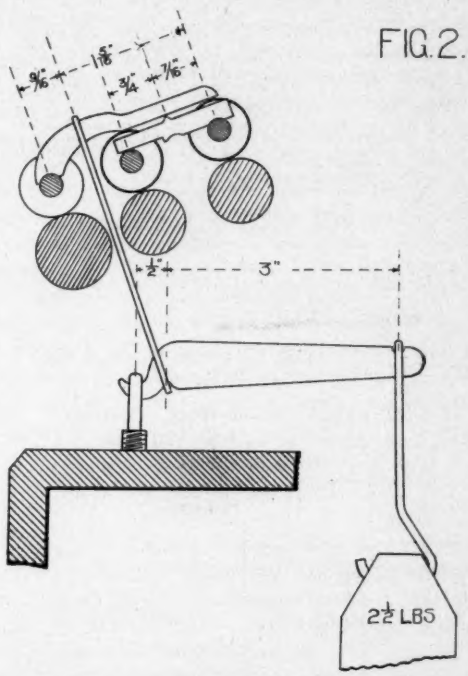
Ring spindles, .178 lbs. × 2016=358.8 lbs.

The cost of labor is nearly always in the favor of the ring frame, there being only occasional conditions when the mule could be said to lead.

The question of power per spindle is one that opens to a great amount of variation depending upon many variable factors. The number of ring spindles per horsepower ranges from 70 to 140, depending upon the number of yarn, speed of spindle, size of ring used, length of traverse, etc. The power required for mule spindles is given as ranging from 90 to 130 spindles per horsepower. Many different cases might be cited showing an advantage for either machine.

In its action, the ring frame is the simplest machine used in the manufacture of cotton yarns, and to obtain the best results it is necessary to have the rolls correctly set and in good condition, as well as the spindles. When handling the ordinary American cottons of about 1″ staple, it is customary to set the front and middle roll apart a distance only slightly in excess of the length of staple. Often when the cotton is quite even the setting between these two rolls is the same as the staple. When the latter case is in force, the front leather roll should be set a little ahead of the steel roll in order to prevent damaging the fiber or making "cockled" yarn. "Cockled" yarn is a yarn containing small bunches or cockles and is caused by the rolls being too close. Under such conditions the middle roll holds back the long fibers allowing the shorter ones that are delivered by the front roll to be twisted about the others forming a small bunch.

FIG. 2.



In A. Fig. 1, is shown a setting for 1⅛″ cotton where, as indicated, the distance between the front and middle rolls is only slightly over 1⅛″.

Another factor entering into this question is the amount of cotton being drawn. When spinning coarse yarns the strain upon the fibers is greater owing to the mass being handled, and for this reason it is well to set the rolls, under these circumstances, rather farther apart than when spinning a fine yarn from the same staple.

One other point, namely the draft, enters into the problem. When running a short draft, owing to the rapid rate at which the material is passing through the machine it is often necessary to spread the rolls farther apart than when using a long draft upon the same cotton.

When spinning long stapled Gulf, Egyptian or Sea Island cotton, a different procedure is used as shown at B. Fig. 1. These cottons are mostly made into fine yarns, and, assuming that the rolls could be spread to accommodate the staple, which is seldom the case, it would not be advisable on account of the long reach from the middle to the front roll,

and the weakness of the strand. Owing to the distance and weakness, the strand would break between these points and wind up on the middle roll. This often happens when spinning the shorter staple cottons, and, excluding dirty rollers, is nearly always caused by two open setting at that point.

A better way is to set the rolls as shown at B. Fig 1 with the distance between front and middle rolls from 1⅛" to 1⅜" depending upon the number of yarn being spun and the amount of draft. With no weight on the middle top roll it acts simply as a carrier to carry forward the cotton fed by the back roll; and its weight is enough to prevent the front roll from drawing away only those fibers which it has an actual hold upon. The middle roll is relieved of all extra weight by slipping the small saddle back into the position shown.

The weight is applied to the spinning top rolls in the manner shown in Fig. 2. The 2½ lbs. actual weight is multiplied by the levers used in supporting it. The total weight upon spinning rolls will vary from 10 to 20 lbs. depending upon the number of yarn spun, the draft, and the speed of the fame. A coarse yarn, a short draft, and a high speed require the most weight. To determine the weight upon the rolls proceed as follows.

$$\frac{2.5 \times 3.5}{.5} = 17.5 \text{ lbs. total weight on rolls.}$$

This 17.5 lbs. is subdivided as follows, to find the weight on the middle and back rolls:

$$\frac{17.5 \times 9/16}{1\ 14/16} = 5.25 \text{ lbs. on middle and back rolls.}$$

$17.5 - 5.25 = 12.25$ lbs. on front roll alone.

To find the weight on the back roll alone:

$$\frac{5.25 \times 12/16}{19/16} = 3.31 \text{ lbs. on back roll alone.}$$

$5.25 - 3.31 = 1.94$ lbs. on middle roll.

Generally speaking the middle roll should have more weight than the back because most of the drawing is done between it and the front roll.

(To be Continued.)

COTTON WASTE SPINNING.

Troublesome Side Threads From Doffer Condenser.—Quadruple Coiler and Cam Motion.—The Condenser System.—Spinning Soft Waste.—Feeding Devises.

BY H. R. CARTER, *Textile Engineer.*

(Continued From January.)

All spinners of condensed yarns are familiar with the trouble caused by irregular side threads, such as cops of irregular diameter, and increased breakages. An arrangement has been invented that does away with all trouble. As applied to the ring doffer condenser it consists in arranging the number of rings on the doffer into equal spaces as required, and in the addition of an extra ring at each end to allow all irregular sliver—caused by the draught of the card and by lumps adhering to the rollers and cleaners—to be doffed by the comb in the usual manner, but not to be carried through the rubbers and on to the condenser bobbin. At each side of the doffer are placed, opposite the irregular side slivers, vertical tubes which are fitted at each side of the dividing roller, carried down below it and coupled to a main tube, at the end of which is fitted a machine provided with an exhaust fan to draw away the irregular sliver which passes down the tubes and delivers it, between two wire cages, in a loose web, in a state to be returned to the mixing. One of these machines will draw away the waste threads from eight carding engines. The advantages of this arrangement are that the outside threads are made equal to any other thread with the minimum amount of waste, the spinning is greatly improved, and cops can be made the full size that the pitch of their spindles permits, which cannot be done when the cops from the side-end are of variable diameter, and must be picked out and rejected.

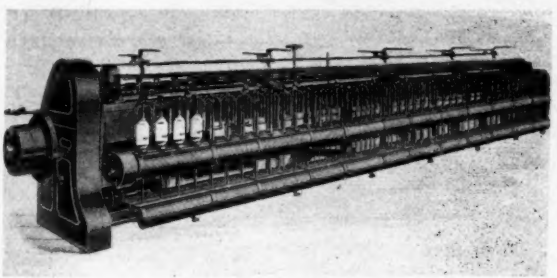


Fig. 9. SLUBBING FRAME FOR COTTON WASTE.

When it is desired to prepare cop bottoms and thread waste to spin a less bulky and level, but a stronger yarn in the finer counts, the "coiler" or "preparation" system should be adopted and a finishing carding engine, with quadruple coiling and can motion, used to follow the "derby doubler" and to provide cans of sliver to feed the slubbing frame, which provides slubbing bobbins to be placed upon skewers in the creel of the self-acting mule or ring frame.

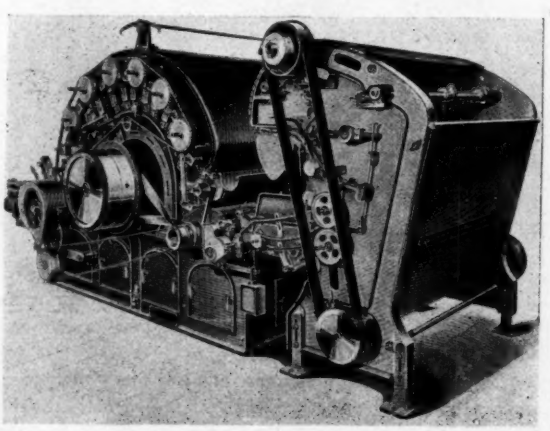


Fig. 10. BREAKER CARDING ENGINE WITH AUTOMATIC WEIGHING FEEDER.

These single finishing carding engines, with quadruple coiling and can motions, are usually made either 40 or 48 inches wide on the wire. They are similar to the carding engine shown in Fig. 3 (December, page 53), but are only arranged to receive two "derby doubler" laps. The fleece

from the doffer, which is stripped by a doffing comb, is separated into four or more slivers either by a steel blade dividing apparatus or by placing leather dividing rings ¼-inch wide between the card rings on the doffer. The slivers then pass through funnels, then between a pair of calender rollers to the coiling motion and into cans.

Occasionally for the lower counts, the cans from the finishing engine are taken direct to the back of the self-acting mule, but they are usually taken to the slubbing frame

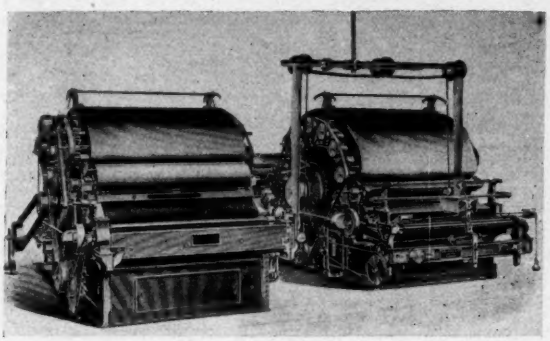


Fig. 11. BREAKER AND FINISHER CARDING ENGINE WITH SCOTCH FEED.

(Fig. 9), which is very similar to the ordinary cotton frame. It may be made any length up to about 152 spindles, and has three lines of bottom-fluted rollers, 1 inch, ⅞ inch, and 1 inch in diameter respectively. The top rollers are solid and made to take one or two threads to a boss. There is one line of tin rollers, with guide wires behind, to lift the slivers from the cans. The flyers have single centrifugal pressers and build bobbins 9 inches long and 4½ inches in diameter. One frame of say 144 spindles will follow four finishing carding engines.

Comber waste may be prepared either upon the coiler or condenser system exactly as described for hard waste, except that neither opening, cleaning, willowing, preparing or breaking-up machines are required, the waste being put direct into the hopper of the automatic feed attached to the single beater lap-forming scutching machine.

For spinning counts say 1's to 5's from soft waste, including scutcher droppings, card fly, cylinders and flat strips, clearer laps, sweepings, etc., the material is opened and cleaned prior to carding, first by a willowing machine with lattice feed sheet and overhead delivery creeper, and then by a picker machine of one cylinder. The former machine is usually made 56 inches wide on the cylinder, and has a production of about 9,000 pounds per week of 56 hours. The picker machine has a welded wrought-iron cylinder mounted with hardwood lags which are fitted with hand-forged steel teeth. It has a lattice feed sheet and feed rollers with reversing motion At the outlet end the machine is provided with dust cage and cage gearing. It is advisable to apply a self-acting soaping machine, and also to provide a fan with cast-iron dust pipe for down draft behind each cylinder. The waste is passed once through the machine before being put in the hopper of the automatic feeder seen in Fig. 10. The production of a single machine, 21¼ inches on the cylinder, is about 6,000 pounds per week of 56 hours, the production of wider machines being in proportion. The cylinder is usually run at about 800 revolutions per minute.

The automatic weighing feeder, seen to the right in Fig. 10, obviates the necessity of making the material into laps for the card. The machine is fitted with a weighing arrangement, by means of which the spiked feed apron is stopped when a certain weight of cotton, which can be regulated at will, has been deposited in the receptacle. At regular intervals this receptacle, or bucket, is opened and the cotton dropped on the constantly revolving feed lattice of the carding engine, so that an equal weight of cotton is always deposited on a certain length of lattice. These motions are capable of very fine adjustment and give a most regular feed. For heavy dirty waste which would become too much matted if made into laps, this feeder is especially suitable, as it delivers the material to the carding engine in a loose condition. The card itself, Fig. 10, is very similar to the card Fig. 5. In front of the doffer and doffing knife, is an endless lattice belt to convey the sliver away sideways from the doffer to the calender roller, which compresses the sliver so that it may carry over the Scotch feed to the finishing card as seen in Fig. 11. By means of the Scotch feed arrangement, the finisher card is fed automatically from the breaker card and the necessity for coilers and "derby doublers" obviated. For very low waste this system is much superior to the "derby doubler" system, as the cotton is delivered to the finisher card in a fleecy condition instead of being consolidated into a lap. The web from the breaker card is compressed by means of two cylinder rollers at the side of the doffer, into a strip of sliver about 5 inches wide. This is then carried by means of the overhead traveling belt to a pair of rollers mounted in a carriage over the feed lattice of the finisher card. This carriage travels sideways across the feed lattice and deposits the web quite regularly.

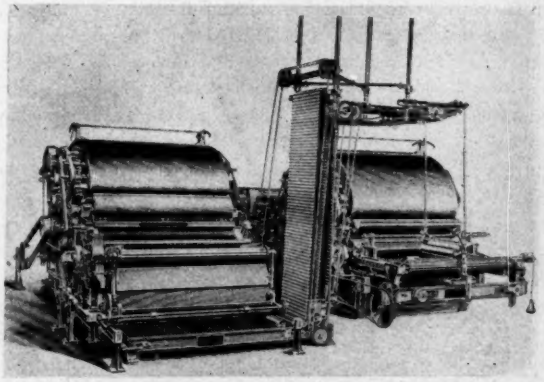


Fig. 12. BREAKER AND FINISHER CARDING ENGINE WITH LATTICE FEED.

The finishing card feed shown in Fig. 12 is an improvement on the Scotch feed, as it does not cross the fibers of the cotton but delivers them to the finisher card in the same direction as that in which they come out of the breaker card. The web is folded by means of a pair of traveling rollers, on a floor lattice in front of the breaker card. This lattice is continually traveling sideways and takes the fleece, which is 16 inches wide, and which consists of about 20 thicknesses of web, to the double vertical lattices, which carry it over the finisher card, where it is delivered on the feed lattice by a carriage similar to the one used in connection with the Scotch feed.

Either the ring doffer condenser or the leather tape condenser, as already described, may be applied to the finishing carding engine of this plant. A breaker and finisher card, coupled, will get through 20 to 30 pounds of soft waste per hour at 170 revolutions of the cylinder, and from 12 pounds for 10's to 30 pounds for 2's per hour for hard waste with 120 to 150 revolutions of the cylinder per minute.

A soap solution which may be advantageously used with the self-acting soaping machine is prepared as follows: To every 15 quarts of boiling water add ½ lb. of glycerine, ½ lb. of castile soap, ¼ lb. of white wax, and 2 ozs. of tallow. (See January article.)

(To be Continued.)

DOUBLING AND HUMIDITY IN COTTON MANUFACTURING.

Distinguishing Cotton From Other Fibers.

BY E. A. POSSELT.

(Continued from February.)

Now with reference to the affair of doubling in connection with the comber, we find, immediately in front of the pan of each head, situated a trumpet, through which the respective film passes, and in turn is condensed into the form of a sliver, which is then passed through calender rollers, and from there onto the front table, which is a long polished sheet of iron, about 12-inches wide and extending along the entire front of the machine, to the draw box.

Guides are also placed on this table in such positions that the slivers in moving along the table will be laid side by side without any friction on each other, and in this position, enter the draw box, where the second and last large draft on the comber is put in, and the six, or more, as the case may be, slivers which are fed to it from the comber heads, are delivered as one sheet and then passed through a trumpet, which condenses the sheet into a compact sliver.

Using, for example, 12 slivers fed at the sliver lap machine, a 6-head ribbon lap machine in which five heads are only used (one cut out), and a 6-head comber, we then get the following doublings:

Intermediate scutcher	4
Finisher scutcher	4
	16
Sliver Lap Machine	12
	192
Ribbon Lap Machine	5
	960
Comber	6
	5,760
1st Process of Drawing	6
	34,560
2d Process of Drawing	6
	207,360
3d Process of Drawing	6
	1,244,160
Intermediate Frame	2
	2,488,320
Roving Frame	2
	4,976,640
Fine Frame	2
	9,953,280
Spinning	2
Doublings made	19,906,560

The construction of the yarn in this case has necessitated 19,906,560 doublings, in order to get the fibers to adhere and lie in the closest contiguity as they leave the front rolls of the set of the drawing head of the ring frame, or, as more often will be the case in connection with these fine counts of yarn, that of the mule, just previously to having the requisite twist imparted.

Now let us change the number of doublings calculated in the previously given example, by substituting in the sliver lap machine, the ribbon lap machine, the comber, and the third process of drawing, the extreme number of doublings ever possible to be met with, viz: 19-8-8 and 8 respectively, i. e., ascertain the extreme total doublings.

Intermediate scutcher	4
Finisher scutcher	4
	16
Sliver Lap Machine	19
	304
Ribbon Lap Machine	8
	2,432
Comber	8
	19,456
1st Process of Drawing	6
	116,736
2d Process of Drawing	6
	700,416
3d Process of Drawing	8
	5,603,328
Intermediate Frame	2
	11,206,656
Roving Frame	2
	22,413,312
Fine Frame	2
	44,826,624
Mule	2
Doublings made	89,653,248

When long fibers dispose themselves outside the twist of the yarn, in a spreading manner, they will cause the yarn to become weaker. The reason for this spreading of the fibers in the yarn may be due to an excessive high temperature in the spinning-room, which, in turn, will render the fibers less pliable and adhering. In connection with some medium counts of yarns this ooziness in such yarns may be a point aimed at in their manufacture, and in fact, some grades of cotton are mixed with the point in view of getting the ooze of fibers to become prominent, in order that the yarn thus produced will permit a very heavy sizing. Again such yarns may be found of advantage in connection with fabrics requiring a soft handle, like flannels, etc.

Again in other yarns, for example those used for thread-making, it is essential that the roundness of the yarn is uniform, the finer counts being spun from long staple cotton. The amount of drafting these fibers will stand is considerable, the individual fibers, as composing the spun yarn, interlacing spirally, according to the amount of twist that has been imparted to the yarn in spinning.

Examining a high count of yarn under a rather low power microscope, it will be seen how differently the fibers forming the yarn behave. Some of the outermost fibers may be found remarkably lively or spreading, and when there is a reduction of the fibers in the thread or when some are displaced from their screw lines, as necessary for forming the thread, it will be the cause of weakness in the yarn. This weakness may not occur in the thinner place or where the fibers are spreading, since there the twist will run in, with the possible result that the thicker portion of the yarn, i. e., that portion containing the greater number of fibers, becomes weak, since there the fibers have a less

amount of adhesion and a less amount of resistance to any strain on the yarn during weaving.

To promote this adhesiveness in cotton yarn, to produce an even and strong yarn, is one of the objects for which humidifiers have become a necessary adjunct to spinning rooms, to reduce the amount of loose fibers in the yarn, besides lessening the amount of fly and dust in the air of the rooms.

So fully have the benefits arising from a humid atmosphere been recognized by cotton manufacturers during recent years, that various methods of moistening the atmosphere, by specially constructed apparatuses, have come upon the market. In some instances water is forced by means of special pumps at a strong pressure, generally about 135 lbs. per square inch, and after being filtered through a strainer it passes through small apertures and impinges against a fixed surface where it is broken up into an infinite number of fine particles, so as to humidify the surrounding atmosphere. In other cases, air is forced at high velocities over wet surfaces, causing rapid evaporation and producing an aqueous vapor, always below the dew point, which tends to maintain the air in the room at a point below saturation most suitable for the class of work being done.

Without question, humidifiers are a most useful adjunct to cotton spinning mills for improving the construction of yarn, to prevent the spreading of fibers outside the body of the yarn, and avert a tendency of such fibers to interlock in the cross wound portion of a cop. However, it must at the same time be remembered that for the removal of such irregularities as neps, the carding engine is the machine where such trouble must be remedied.

Before closing, it will be of interest to manufacturers to quote a few tests for distinguishing cotton from other fibers.

To determine the presence of cotton in connection with wool or silk, by means of a chemical analysis, the sample must be thoroughly boiled with water in order to extract the sizing and color. When this is done, about 0.1 gram is put in a test glass with 1 c. c. of water and two drops of an alcoholic solution (15-20 per cent.) of a-naphthol, and as much concentrated sulphuric acid as there is liquid already. Cotton, as well as other vegetable fibers, if present, is readily dissolved, and the liquid assumes a deep violet color when agitated; wool or silk gives a more or less yellow to reddish-brown coloration.

To ascertain the percentage of cotton in a sample composed of wool and cotton, boil the cleaned, dried and weighed sample gently for two hours in 8° B. caustic potash, then wash it well and re-dry it. During boiling add from time to time a few drops of water so as to prevent the alkali from becoming too concentrated. After drying at 212° F. the residue is weighed, the result giving the weight of cotton, and the loss that of wool. Instead of potash, 7° B. caustic soda may be used, boiling being in this case restricted to a quarter of an hour.

To separate wool from cotton, remove any size or dye by boiling the sample in dilute hydrochloric acid, dilute lye, or by extraction with alcohol, ether, etc., and dried at 212° F., then placed in four parts of sulphuric acid and one part of water for twelve hours, afterwards mixed with three volumes of absolute alcohol and water, and filtered. The residue is washed in absolute alcohol until the washings are colorless, and afterwards with water, being finally dried and weighed to ascertain the weight of wool present.

Another method is: After freeing the sample from dye and sizing as before, and washing, the same is dried and weighed, and then immersed in ammoniacal copper oxide for twenty minutes, after which water is added. The residue left after filtration is thoroughly washed, dried and weighed, the result giving the amount of wool in the mixture.

To separate silk, cotton and wool in a sample containing these three fibers, remove the size and dye, as previously explained, and in turn treat the sample with ammoniacal nickel oxide, which dissolves the silk at once. The cotton in turn is then dissolved from the remaining portion of the sample by means of ammoniacal copper oxide, leaving the wool behind.

To ascertain the percentage of each in a sample composed of silk, cotton and wool, two samples of yarn, each weighing 2 grams, are dried, weighed and boiled for a quarter to half an hour, in 200 c. c. of 3° B. hydrochloric acid, to remove the size and dye, and are then thoroughly washed and pressed. One sample is then immersed for a short time in a boiling solution of basic zinc chloride, then washed thoroughly, first in acidified, afterwards in clean, water, then dried and weighed, the difference in weight giving the amount of silk. The second sample is then boiled for fifteen minutes in 60 to 80 c. c. of caustic soda (sp. gr. 1.02), and then washed, dried and weighed, the difference in weight representing the proportion of wool. The residue is cotton, the dry weight of which must be augmented by about 5 per cent. to compensate for the corrosion of the fiber during the operation.

BLUE BENDER COTTON.

Objectionable for Bleach Goods.—An Interesting Case.

The Arkwright Mills, Fall River, R. I., have brought suit against the H. B. Claflin Co., of New York, before an auditor, to recover about $2,700 which, they claim, is due them on a balance of a sale of some 5,500 pieces of cloth. It is alleged that 10,000 pieces were contracted for by the Claflin Co. in September, 1900, and that after 5,500 pieces had been delivered the defendant ordered the cancellation of the remaining shipment due and that this was complied with.

The suit is interesting as determining to what extent the presence of "blue bender" cotton in goods will justify the vitiating of a contract.

The defendant claims that by reason of the presence of "blue bender" cotton the goods were unable to be properly bleached. They further requested the mills, they say, to take back that part of the original shipment that was not bleached, but that the mills declined to do so, and that after due notice to the mills, the Chaflin Co. sold the unbleached goods and remitted the proceeds to the mills.

Up to this time, according to the mills, there had been no special complaint against "blue bender" cotton, but shortly after the controversy the defendant issued circulars warning sellers that goods containing "blue bender" cotton would not be received by them.

KNITTING

A GOOD WEARING AND ELASTIC FABRIC.

The accompanying illustrations relate to that class of ribbed knitted fabrics, which have wales on one side and meshes on the opposite side, and with which is combined a yarn having projecting loops which can be submitted to a brushing or gigging action, so as to produce a fleecy surface upon one side of the fabric.

The term "loop" as here employed is not to be construed to mean a laid in yarn the portions whereof, intermediate the points at which it is tied to the base fabric are non-looped, that is to say are disposed substantially parallel with the floats of the ribs of the base fabric where not tied thereto.

FIG. 1

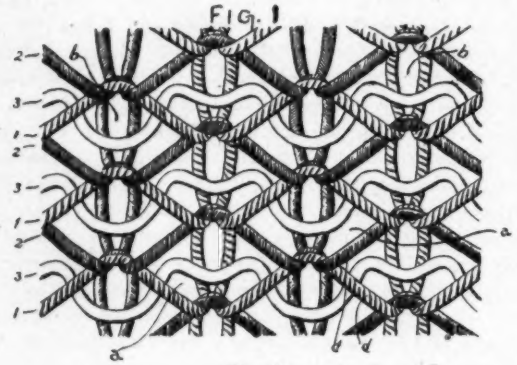
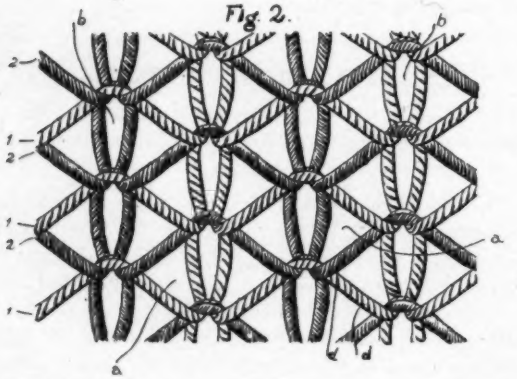


Fig. 2.



The base fabric is formed of an alternating series of longitudinal wales, knit each from a different yarn, or from the same yarn at different times if so desired. The stitches forming the wales are all drawn toward the outside of the fabric. The loops forming each wale, each include a portion of the other yarn connecting the two neighboring loops at the back of the fabric. The connecting portions of the loops form four-sided meshes on the back of the fabric, which thus exhibits on one face parallel longitudinal wales alternately of different yarns and on the other side lozenge shaped meshes or reticulations formed by the connecting legs of the loops.

The object is to produce a fabric having superior wearing qualities, a considerable amount of elasticity, and a ribbed face side, resembling very nearly the "Strutt" rib in conjunction with a fleece side. This object is attained by knitting a fabric from a plurality of threads, the fabric being of double thickness, each thread or series of threads forming independent wales alternately arranged, the connecting threads of each set of wales being interknitted with the intervening wales, the wales forming the ribs of one side of the cloth, and the connecting threads forming meshes on the opposite side, the fleecing thread being laid between the wales and meshes.

In the drawings, Figure 1 represents in exaggerated form, a complete piece of the fabric. Fig. 2, a piece of fabric having the fleecing thread withdrawn.

1 and 2 represent successive courses of stitches, 3—3 the floating threads forming the fleecing loops and —*a*—*a*— are the meshes and *b*. *b*. the wales.

It will be observed that the fleecing thread, 3, is inlaid between the wale threads *b*, and the mesh threads, *d*. And that it is drawn in loops or piles through the meshes —*a*—*a*— and that it can be drawn in any desired lengths, and can easily be brushed or napped to form fleece, without weakening the knitted portion of the fabric in the least. By knitting a fabric in this manner one is enabled to insert a very considerable proportion of fleecing thread with reference to the finished fabric, as it will be observed that it is possible to draw a fleecing loop through each and every mesh comprising the inner face of the fabric if so desired.

MEANS FOR DETECTING IMPERFECTIONS.

We, herewith, illustrate certain means for detecting imperfections, such as knots or lumps at the needles of a knitting machine and for arresting the operation of the machine when such imperfections occur in the fabric at the needles.

It is aimed to provide a needle protector of simple construction and one which will be sensitive and effective in operation.

Figure 1 is a plan view of a dial cap or cam carrier of a circular knitting machine with the new device associated therewith. Figure 2 is a side view of a portion of the knitting head with the device thereon, and, Fig. 3 is a side view of the needle protector device in its relation to the needles.

The detector finger, as shown in Fig. 3, depends so that its lower end is in close proximity to the needles and thus if any lump or knot occurs at the needles the finger will strike it in the revolution of the machine and the finger will therefore be pressed aside from vertical position so as to cause the operation of the stop motion connections. For controlling these stop motion connections there is employed a vertical extending post B movable vertically and pressed upwardly normally by a spring, the post carrying an arm or pin C extending laterally therefrom and having a groove extending circumferentially thereabout in which groove an extension D of the detector clamping pin lies when the detector mechanism is in normal position ready to be operated. This laterally extending arm or pin is adjustably connected with the vertical post by a set screw.

The detector finger being straight can be set in the opening of the clamping pin in any position, as regards its circumference and under all adjustments its end will be

directed to the proper point in relation to the needles. This is not the case in some other constructions in which the finger of the needle protector is bent and therefore must be fixed in a certain relation to the parts to which it is attached.

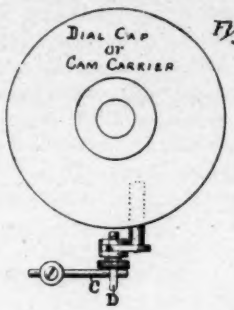


Fig 1

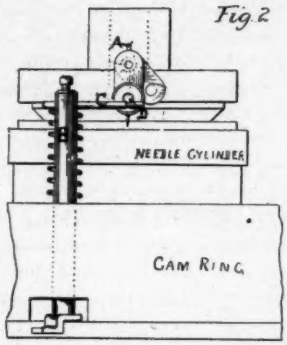


Fig 2

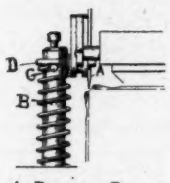


Fig 3

ANTI-POISONING HOSIERY.

The manufacture of hosiery with a colored exterior and an uncolored interior surface is here shown.

Figure 1 shows the exterior of a stocking. Figure 2 is a view of the stocking turned, or the interior surface of the same, and Fig. 3 is a view of the interior of a modified form. In Fig. 2 the inner surface of the entire foot is uncolored and in Fig. 3 the heel, sole and toe alone are white.

It has been claimed by many that colored stockings have been the cause of blood poisoning, especially in cases where for any cause the skin of the foot of the wearer has become abraded. In order to guard against this, stockings having entirely white feet have been made and put on the market. There also have been stockings made in which the heel, bottom of the foot and toe of the stockings have been made of white or uncolored yarn. It has also been proposed to make stockings that shall be free from this objection by knitting the portion desired two threads, one of the color and the other a white thread and plaiting the white thread on the inside of the foot or heel, bottom of the foot and toe.

These various forms of stockings are each open to objection in one way or another. The white foot and the white heel, sole and toe are objectionable, as the white often becomes stained and discolored from contact with the leather of the shoe and becomes unsightly. The plaited stocking is also open to the objection that the plaited portion of the stocking is never of the full color of the main body of the stocking, such portion having a mottled appearance composed of a blending of the colors of the plaited yarns. In such cases the white thread is more or less visible from the outside and the whole of the outside of the stocking is not of the uniform color desired.

By the present arrangement these objections are obviated and a stocking is produced which has the desired uniform color on the exterior and yet has a white interior surface for the entire foot or such portion of it as is desired. This stocking can be made in several ways. The stocking can be full dyed and then turned and the color on the inside to the extent desired discharged by a suitable discharge medium, or a stocking knit of colored yarn can have the surface on the inside to the extent desired discharged of coloring matter and restored to its original color.

The stocking can be knit of white material and then such parts of the interior surface as it is desired to have remain white, may be printed with what is known as a "resist" and the stocking then dyed, or the exterior of the stocking may be colored by printing after the manner of printing calicoes.

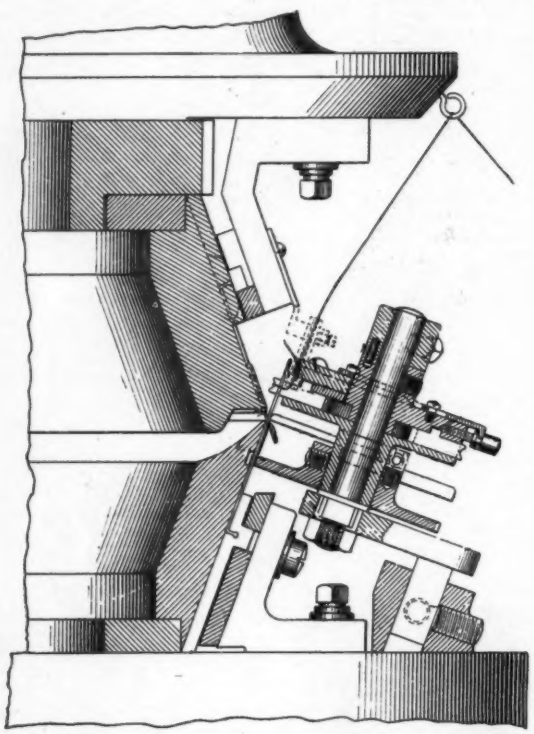
SINKER WHEEL FOR A CIRCULAR MACHINE.

The accompanying illustration is a sectional elevation of a portion of a circular rib knitting machine showing an improved sinker wheel and its adjusting devices.

Among the objects of this arrangement is to combine two sets of inclined needles in a circular rib knitting machine with a sinker device having sinkers movable relatively thereto in and out between the needles of one of the sets of needles, substantially at right angles to the primary set of needles; also to provide a sinker wheel which is adapted to be used in connection with the needle cylinders of a circular rib knitting machine and is particularly constructed and adapted to be used in combination with two conical needle cylinders using spring needles for the purpose of knitting a tubular ribbed fabric; and furthermore to provide certain mechanism for rotating the sinker wheel and means to adjust the sinker wheel relatively to the rotating mechanism.

The advantages derived from this sinker wheel and its combination with the needles of the lower cylinder of a circular rib knitting machine employing two conical cylinders are as follows: The sinker wheel enables the sinkers to be set so that they will be at right angles to the needles adjacent thereto and will feed the yarn between the needles at right angles to these needles.

The sinker wheel as compared to the sinker ring does not in any way interfere with the handling of the machine, that is, with the ready access by the operator to the needles on the lower cylinder when he desires to put the cloth on the needles, or when he desires to have access to the needles for any purpose. The space between the feeds is left entirely clear for the operator to plier or otherwise manipulate the



needles in order to get the best results in the operation of the machine.

The sinker wheel is cheap in construction, requires little power to operate it, and the gear by which the sinker wheel is rotated is driven by the needles at a point where these needles are firmly supported upon each side of the gear. Each feed has a separate radial adjustment independent of the other feeds and their relation to the needles. The location of the sinkers at right angles to the needles of the lower cylinder or in relation to the primary set of needles in a machine employing two conical needle cylinders, locates the sinkers at an angle to the secondary set of needles, or in this case, the needles of the upper cylinder. Therefore, the space between the back of the needles of the first set and the front of the needles of the second set, or the tricks in which the second set are adapted to slide, is ample to allow of any desired length of loop being fed between the needles of the first set by the sinkers without danger of the sinkers colliding with the needles of the second set.

The sinker wheel and cam can be placed very close to the needles and to the upper edge of the lower cylinder, so that a very short and light sinker can be used and it will not be necessary to mill off the edge of the sinker in order that the same may not take up too much space between the needles, for the reason that the sinker is supported so close to the needles that a light sinker of the same thickness throughout its entire length may be used.

By the relative arrangement of the sinkers to the needles and to the presser, rendered possible by the arrangement of the sinker wheel in relation to the two conical needle cylinders, the primary needle has a very short distance to travel before the old loop on the primary needle is landed on the outside of the beard of the primary needle preparatory to being cast off of the primary needle, and the new loop fed to the primary needle by the sinker is held by the sinker on the primary needle under the beard thereof until a presser has fully closed the beard, so that better plaited work can be made, and, moreover, the needles driving the sinker wheel gear by the bodies thereof between two supporting points, this driving of the gear does not in any way interfere with the straight movement of the upper ends of the needles after they pass above the upper edge of the lower cylinder, so that the needles are not sprung laterally in driving the sinker wheel.

KNITTING WITH THREE YARNS.

The accompanying illustrations show a knitted fabric with three yarns, of which two yarns constitute the base fabric. The three yarns produce in effect parallel rows of different sized ribs, lined on the inner side with a layer or backing.

In the arrangement of the various yarns, the backing is woven between the facing yarn, and the tying yarn used for holding the backing yarn in place, and is not visible from the face of the fabric. In addition to tying the backing yarn, the tying yarn is also used as a part of the facing of the fabric.

Broadly speaking the prime object of arrangement is to provide a fleece-lined fabric formed by three distinct yarns, the fleece yarn not being visible except on the inner face of the fabric.

Figure 1, is a diagrammatic view showing the arrangement of the yarns for forming the fabric, and looking from the inner side. Figure 2, is an inside view on an enlarged scale, of a piece of the fabric. Figure 3, is an enlarged view looking at the face of the fabric.

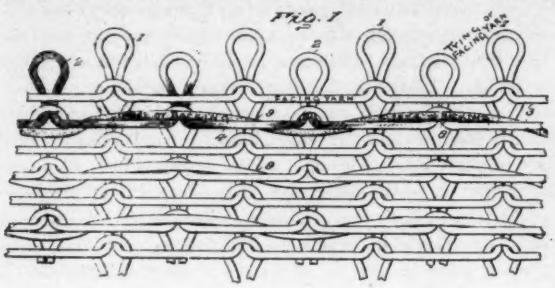
The fabric consists of parallel rows of ribs 1 and 2, the former being somewhat larger and considerably looser than the latter to present a pleasing effect.

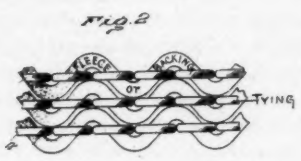
The fleecing or backing yarn is the essential feature of fabric.

The fleecing or backing yarn, is passed over the shank of a loop or rib 2, as shown at 8, then over the adjacent rib 1, and under the tying or facing yarn 4, and over the loop of the next row of ribs 2, and under the tying or facing yarn 4, again and over the loops of the ribs 1, as indicated at 9, then over the loop of the third row of ribs 2, and so on throughout the whole body of the fabric. It will thus be seen that the fleecing yarn appears on the back of the fabric first on one side and then on the other side of the connecting legs into which it engages.

The tying or facing yarn as it is drawn into place, tightens on the inner side, and as the fleecing or facing yarn

covers a greater surface in proportion it will be apparent that one side (inner side) of the fabric will present substantially a fleece-lined effect, while the opposite (outer side) presents parallel rows of ribs of different proportions, the fleecing or backing yarn being covered on one side by the ribs. The ribs 1, being loose, are therefore more prominent than the ribs, 2, and provide sufficient elasticity which is essential in this class of fabrics.





The ribs 1, may be made loose enough to entirely cover the ribs 2, if desired, as the yarn from which they are formed does not in any manner interlock with the backing or fleecing yarn.

The two rows of ribs may or may not be of the same color, and material having different charactertstics for producing various designs may be substituted for yarn.

Without the future contract the spinner could not make contracts to sell his goods ahead, for the reason that if he could not contract ahead for the raw material, he could not contract ahead to sell the manufactured product.

It is easy enough for us to specify the evils from which we suffer and the good to which we aspire, but how to bridge the chasm between the two is yet to be learned.

DYEING, BLEACHING AND FINISHING

CALICO PRINTING.

After Leaving the Printing Machines—Steam Colors—John Graham's Method of High Pressure Steaming. Substantive and Adjective Colors—Tannic Colors—Naphthol Colors—Oxy-Azo Dyes—Resist Styles.

BY HENRY G. KITTREDGE.

VII.

After the pieces have left the printing machine they are dried as soon as possible, and it is essential that the face of the goods should not be touched until the colors are dry or nearly so. For this purpose there are two systems in use,—chest drying and hot air drying,—the former being the method usually resorted to, that of passing the goods over, but not quite in contact with, iron steam chests which are placed in a room or apartment situated either on the same floor as the printing machine itself, or on the one above, generally the latter. The hot air drying is used for those colors that are liable to have their shade effected if over heated or baked.

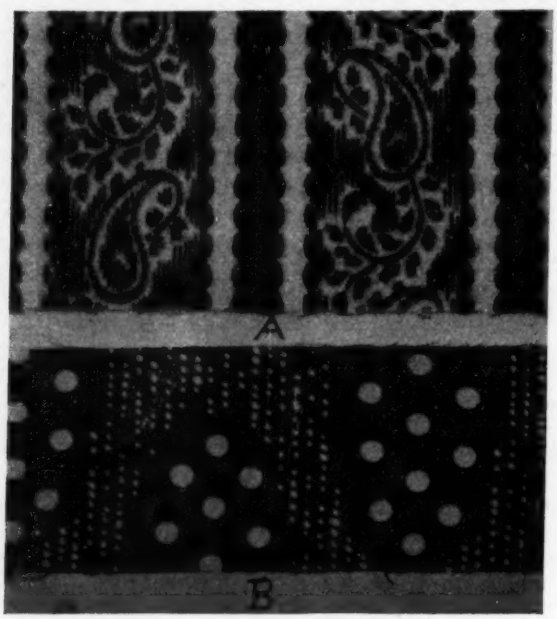
Steam colors is a term that has been applied to topical colors printed in the ordinary manner and fixed by steam. The application of steam for this purpose, of making colors adhere to the fiber, was first attempted about the latter part of the 18th century, as Edward Bancroft in his work on dyeing, published in 1797, states that he had succeeded in fixing the coloring-matter of quercitron by this process for many years. Little attention, however, was paid to the subject either in England or on the continent, but by 1819 this new method of fixing colors was pretty extensively applied in France to woolen and silk goods. From that time it extended, and by the middle of the last century was quite universally practiced by calico printers on cotton and other fabrics with the best results. Very few colors attach themselves firmly to the cloth by being merely printed on together with the mordant, but by exposing the printed cloth with mordanted colors to the action of steam the coloring-matter becomes firmly fixed to the fibers, combining a degree of brilliancy with solidity of color.

John Graham of Hartshead Print Works, near Stalybridge, Lancashire, England, received a patent in 1855 for improvements in fixing certain colors on yarns and textile fabrics which consisted in subjecting them, after being dyed and printed in the usual manner, to the action of high pressure steam, or a mixture of high-pressure steam and air, or of water heated and under pressure, or mixed with certain chemical solutions which elevated the boiling point of the liquid so as to expose the yarns or fabrics for a shorter period than was then required in steaming—to a temperature ranging from 250 to 300 degrees F. more or less. The colors or lakes to which these improvements applied, as having been found most applicable, were madder, cochineal, logwood, quercitron and other dye-stuffs of like nature, in combination with oxide of iron, alumina, tin and other mordants. This method was found to operate very satisfactorily for the production of printed calicoes.

The practice still in vogue of dividing dyes into two classes,—substantive and adjective,—is one that was established more than 100 years ago by Edward Bancroft. Substantive colors are those which like indigo extract, benzo purpurin and some other coal tar products, will dye the textile fibers directly, and adjective colors are those which will dye only with a metallic salt or oxide, or with the addition of a metallic salt or oxide to the dye bath, as, for instance, logwood, alizarin, cochineal, fustic, etc.

In the pure state, the adjective dyes are generally but slightly colored and when used alone in dyeing they give rise to worthless results of no permanent character, but when used in conjunction with metallic mordants such as

salts of iron, chromium, etc., intensely colored insoluble compounds, or so called lakes, are produced in the fiber which thus becomes dyed. When applied to the printing machine they are mixed with a thickening material to allow of their being properly spread upon the printing rolls. The actual fixing of the color is usually accomplished by submitting the printed or dried pieces to the action of steam which renders part or the whole of the thickening material insoluble in water, thus binding the pigment to the fiber and rendering it incapable of being washed away by water. This style is the simplest of all, as the colors are already produced for the printer and their application is merely a mechanical one which makes it unnecessary for any prep-



Pattern A. Printed with 10% Fast Printing Green, 10% Iron Mordant (Red) Paranitraniline Red. The dark shades represent green except the palm leaf and sprig which are red. Fast Printing Green is well adapted for printing on a Beta Naphtol ground by the side of ice colors to obtain bright, fast green shades and for the production of green resists under ice colors.

Pattern B. Padded with 5% Gallo Navy Blue R D conc. paste for body of design, discharged with oxidising agent as seen in white spot.

aration of the cloth before printing beyond the usual bleaching necessary to obtain a pure white ground. The thickening or binding material usually employed for these colors or lakes is albumen, either in the form of blood or egg albumen, the former being usually selected on account of its lower price, the latter only for light or bright shades. Of late years, blood albumen has been improved by a process for its partial bleaching which renders it capable of being used for a much larger number of colors than formerly, and at the present time egg albumen is employed only to a comparatively limited extent. Goods printed by this method have a harsh feel because the thickening material or rather its albumen constituent remains on the cloth when it is finished. On this account the colors treated in this way are used mostly for patterns of small sizes.

The tannic colors, sometimes better known as the basic colors, are very important as comprising some very desirable shades and tints, and are largely used by the calico printer. The term tannic color is more frequently used in the print works because the colors are fixed on the cloth by the use of tannin or tannic acid. They have practically no affinity for cotton, but possess the property of forming an insoluble color-lake when they are mixed with a solution of tannic acid and steamed after printing.

The allied naphthol colors or style, have introduced into the printing of cotton goods a new thing, and refers to the application of what is known as the insoluble oxy-ozo dyes to cotton. Their use has been greatly developed within a comparatively short time, forming a highly important branch of the coal tar color industry, and new products are constantly being brought to the market which, as a rule, are superior to the older ones either in point of brilliancy or fastness. Their importance was brought to the attention of dyers by Peter Griess, in 1878, though the first to introduce their method of application was Read Holliday & Sons, in 1880, who gave to it the name "vacanceine" style. The principle of this process is that if a solution of a diazotised amine is added to a solution of alpha—or beta—naphthol an insoluble color is produced. By using various combinations of these classes of bodies a very large number of shades can be produced. In this process, as applied to calico printing, the formation of the insoluble color takes place within the fibers of the fabric and the particles are thus fixed upon the tissue. The most important colors obtainable by this process are the various shades of red and maroon. To diazotise means to bring about such changes in a compound that a diazo compound is formed, signifying, in organic chemistry, a compound in which two nitrogen atoms are united to a hydrocarbon radical, diazo being derived from "di," meaning two, and azote, meaning nitrogen. The prefix "alpha" refers, in chemistry, to the first of a series or groups of compounds, and "beta," to the second of a group of compound amines or a group of bodies derived from ammonia, and are valuable in being the bases from which coloring matters can be obtained. A large number of the shades produced by the use of steam colors can be resisted, and many of the effects are obtained in this manner for producing what is referred to above as the resist styles. The particular substance used for resisting the color printed over the piece depends upon the nature of the mordant and the coloring matters contained in the printing color; while there are some coloring matters which so far cannot be satisfactorily resisted. Sir Robert Peel of Bury, England, is credited with being the first to print calicoes on the resist work system, in 1802, consisting in the printing of various mordants on those parts of the cloth intended to be colored, and a paste or resist on such parts as were intended to remain white. The plan it is said was discovered by a commercial traveller named Grouse who sold the process for $25. The principle of the resist style of printing consists in the topical application of some substance which will resist the action of mordants or tinctorial matters upon the fabric, and these substances ought to admit of being afterwards detached from the fabric by processes which will not injure the colored ground, leaving the parts to which they were applied either pure white or some desired shade. Resists have been used from time immemorial in India and China, where to produce white designs on colored goods the practice was to trace the patterns on the white stuff in melted wax and then to immerse it in the dye bath, after which the goods were passed into boiling water to melt off the wax.

Resists, or reserves, as they are sometimes called, may be divided into three classes—mechanical, chemical and physical. A *mechanical resist* is any kind of preparation resembling in its operation the wax employed by the orientals and which has the simple effect of protecting the goods from coming into contact with the dye stuff at those parts where it is applied. A *chemical resist* is any substance which, when printed on a fabric without permanently adhering to it, possesses the property either of precipitating the coloring matter or base of the mordant and rendering it insoluble or of altering its properties. A *physical resist* may be understood to mean insoluble matters which in contact with the fabric absorbs the mordant or coloring matter and prevents it from penetrating the goods. Such is the effect of pipe clay when it is deposited upon a fabric mixed with other substances.

Resists of the mechanical nature when used are chiefly for silk and woolen goods or challis, but under some circumstances they may be appliled to cotton goods. The active principle of chemical resists that are employed to prevent the deposition of a mordant on particular parts of the cloth, is generally an acid or acidulous salt capable of uniting with the base of the mordant to form a compound soluble in water. Those which are employed to produce a white or tinted pattern on a colored ground are those which act directly on the coloring matter itself; employed, for example, in connection with the indigo vat.

ELECTROLYTIC BLEACHING OF COTTON.

A German chemical engineer has invented a new method for the electrolytic bleaching at cotton, relating particularly to the bleaheing of yarn in bulk, but is also applicable to the bleaching of cops and pirns. According to this method the material is first treated with a solution of caustic soda, then with one of bleaching liquor, and finally with a weak solution of sulphuric acid.

The mode of proceeding is as follows: A solution of common salt is allowed to flow through a suitable electrolyzer, whereby on well known principles it becomes charged with bleaching agents and forms the bleaching liquor. A convenient mode of estimating the proper working of the electrolyzer is by the difference in temperature of the inflowing and outflowing solutions, a rise of 55 to 65 degrees F., being an indication that the proper strength is being attained. The bleach liquor is then allowed to flow into a receiving tank whence it is drawn into a measuring tank ready for use.

The material to be treated is meanwhile packed into the vat in which it is to be bleached, the bundles, in the case of yarn, being placed on end so that the solutions will flow up or down through them more easily.

The caustic solution is then run into the tank and is caused to circulate therein. The caustic removes any greasy and other matters that might interfere with the action of the bleach solution. While the caustic is acting the vat is kept tightly covered and after the liquor has been raised nearly to the boiling point by the injector, the cover is removed and the external circulation by the pump from the bottom of the vat back into the top of the same is started. After a suitable time the caustic is run off and clear water is admitted so as to rinse the material.

When the caustic residues are thoroughly removed, the bleach liquor is pumped in from the measuring tank and is allowed to act for a suitable time, being circulated by the pump. It is then run off and the material is again rinsed. The solution of sulphuric acid is next admitted and serves to scour the material, after which the latter is finally rinsed and is removed from the vat. It may then be treated in a rinsing machine and dried, first say by centrifugal driers or wringers, and then in a drying room.

In dealing with yarn, the same does not require to be handled in any way during treatment, but is simply packed in the vats in the bundles in which it comes from the mills and is left absolutely *in situ* the whole time, until it is ready to be removed from the vats to be dried.

The solutions employed may be of the following strengths:—For treating say a thousand pounds of cotton yarn, the salt solution may be formed by dissolving 900 pounds of salt in 100 cubic feet of water; the sulphuric acid solution by adding 20 pounds of commercial acid (at 66 degrees Baume) to 150 gallons of water; while the caustic soda solution consists of 20 to 30 pounds of NaHO dissolved in about 25 cubic feet of water, and it is heated to about 50 degrees before it is used. Obviously these proportions may be varied somewhat according to the material under treatment, and according to the results obtained in the experimental vat. It is desirable also that the material should not be subjected to the action of the liquors longer than may be necessary, especially when dealing with loose fluffy yarn.

BOILING KIERS.

BY PROGRESS.

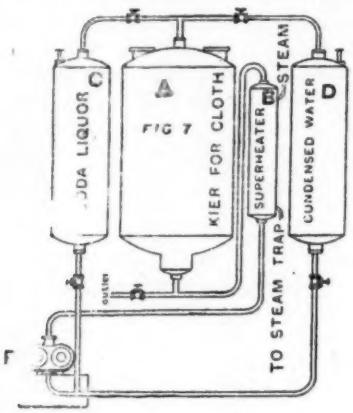
(*Concluded from January*).

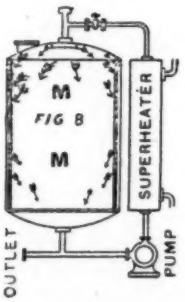
I had, about the same time as last referred to, the opportunity of examining very minutely another boiling kier, which for a time acquired a fair amount of success on the Continent. It was known as the "Gebauer" kier, and Fig. 8 shows it in section. The system has generally two kiers, with one pump and one superheater. The kiers are small, of about 1½ tons capacity each, and the system is identical with that shown in Fig. 5 (December) as regards the circulation and heating of the liquor. The important difference between the two systems is seen in the perforated shell inside the kier (Fig. 8.) The shell is perforated about four-fifths the depth of the kier, and the patent is based on this construction, because it facilitates the circulation. My opinion at the time was, however, that the circulation was not facilitated by the perforated shell, but that on the contrary, the reverse was the case. The liquor will, of course, follow along the line of least resistance—which will be that shown by the arrows; M will be the position of greatest resistance, and will naturally receive less liquor. The larger the kier, the more uneven and uncertain will be the circulation. For this reason I was not favorably impressed with the system, and could not recommend it.

There is one more system of boiling yet to be mentioned—that is, the kier heated by coils. These are placed under the false bottom, or (more generally) in a well at the bottom of the kier. (Fig. 6 December.) I said at the beginning of this article that the kier heated by fire underneath was very much akin to the kier heated by coils. The principle is exactly the same. The goods are forced up-

wards as the liquor expands with the heat. (Some of the liquor, I admit, is forced up the puffer pipe, but only in small quantities.) The proof that this is the case may be found in the fact that to keep the goods from being forced to the top of the kier large pieces of wood or iron are laid across them, and on these are fixed props to the top of the kier. Indeed, the upward pressure is so great as to double up old "beetle-fallers" like matchwood, and to bend the iron cross-pieces! An article appeared lately by an American writer who said:

"The low-pressure system of boiling is not so economical as the high-pressure, although there is a little more risk with the high-pressure kiers of having blown cloth and tender places. If care be taken to pack the cloth level and tread it down evenly in the kiers, the risks are reduced to a minimum. The top of the kier is covered with burlap, and the goods are packed down with square blocks of





wood to prevent their turning over during the boiling process. The goods are boiled for eight hours at 12 lb. pressure."

The writer does not say what kind of a kier it is; but whatever system it may be, the fact of having to use "blocks of wood to prevent their (the goods) turning over," is evidence that it is a kier in which the goods are liable to float, and to have "blown cloth and tender places."

I have worked the kier shown in Fig. 5 (December) over 20 years without having the slightest difficulty with the goods floating or with having blown cloth or tender places. These are difficulties that can hardly ever occur in this kier (Fig. 5) or in the Mather kier. The circulation in any kier in which the goods float and have to be kept down by the means just described cannot be equal; and when the pressure at the top of the kier is so great as to double up blocks of wood six inches square like matchwood, I consider such a kier dangerous and uncertain in its work. The least unevenness in plaiting the goods will provide ways through which the liquor will easily find its course, and will cause blown places and tender cloth. These kiers ought not to be worked without two safety-valves, one on the top and the other at the bottom. I have dwelt rather long on the last system of boiling, because I know it is being worked in certain places, and its promoters and advocates claim that it is a success.

I have not the slightest doubt that a passable bleach can be achieved by any of the systems of boiling I have mentioned, under the different operations peculiar to them; but the question is—can it be done better and cheaper by any other system?

The idea (for it can only be an idea) that the caustic bleach is more severe on the goods, and that it leaves the cloth with a harsher feel than the lime bleach, is, I believe, founded on prejudice, not on fact. When I made the change from the lime to the caustic bleach, I made a great many tests to get the relative strengths of the warp and the weft of cloth boiled by the two systems—and the result was always, without exception, in favor of the caustic bleach! With regard to the caustic bleach imparting to the cloth a harsher feel, this, too, is equally a mistaken idea. Even if such were the case—I know of a certainty it is not—what has this to do with cloth that has to be stiffened? Do not the finishers of cloth bleached by the lime bleach use starch and softening? It is by the introduction of these two articles, along with the proper use of machinery, that mellowness or harshness is imparted. No! this is "a lame excuse," which has its origin in incompetence.

I have tried to explain in as few words as possible the different systems of boiling that I have had the opportunity of working or seeing at work; and I hope that, with the diagrams and explanation, it may be the means of causing some bleachers to look into the matter of boiling. Much indeed depends on this process—so much so, that I think it worthy of being taken seriously into consideration by bleachers, who might cause a fair trial to be made—in which case I am sure the caustic bleach would take the place of the lime bleach, much to their benefit. But unless the trials be undertaken without bias, the bigoted conservatism so prevalent among bleachers will continue, and the open kier will go on swelling the coal and chemical bills and the wages account. At the same time, it will continue to be made difficult for the merchant to compete in the open markets with his formidable competitors, where a few cents per piece (of 40 yards), and sometimes less than a cent, makes all the difference between securing an order and losing it. The time has therefore come for taking these apparently small items into consideration.

If the difference between the cost of boiling in the open kier and the kier shown in Fig. 5 were seriously gone into, it would be found to be considerably more than two cents in favor of the latter. This, for a place doing between 12 and 14 tons per day would mean a great saving directly, and indirectly a sum not to be despised.

Before closing this article, I will give a few important data with regard to the boiling kier shown in Fig. 5, and the same will apply to the Mather kier for white shirting bleach:

(1)—I find that soap or "soluble" is better than resin to mix with caustic soda.

(2)—The soda liquor should be run in the kier at the bottom by gravitation, in quantity sufficient to cover the goods well.

(3)—The air valve not to be less than 1½ in., and not to be closed before all the air is out.

(4)—The superheater for a 3¼ ton kier should not be less than 28 inches in diameter, with as many 1½-inch pipes inside as possible; the height or length of the superheater to be the same as the parallel part of the kier, about 9 ft. It is a great mistake to have the superheater too small.

Some of the heavy, slow-running looms could be guaranteed a life of 50 years, for most of these are well built; but it is not wise to allow less than 3 per cent., as this is a class of loom which is likely to be improved still further, chiefly in the matter of higher speeds.

The number directly dependent on the lace industry about Nottingham, Eng., is estimated at 50,000, and the number indirectly dependent thereon is probably 125.000—half the town's population.

MARKET REPORTS

THE KNIT GOODS MARKET.

The close of January found the market in an unsatisfactory situation, with manufacturers and agents making every effort to secure new orders to keep their plants running, which resulted in some concessions in prices, with more or less irregularities, that left both sellers and buyers in a quandary as to what was best to be done. Manufacturers were in great need of orders, and cash sales generally brought about concessions which unsettled trade with particular advantage to none. Buyers who came from a distance to make purchases returned in many instances without giving any orders, preferring to await further developments. Both hosiery and underwear were influenced by the same conditions.

We find, however, that at the end of February the market shows a decided improvement, with indications for a better demand for goods, as noted in the large number of buyers who are disposed to place orders for spring and summer lines. There is a feeling that buyers have delayed operating as long as it is safe for them to do, and in many cases considerable anxiety is expressed concerning the securing of goods for future consumption especially those for the immediate spring and summer trade. Many who had cancelled their orders last fall at the time of the money stringency are now in the market to have their old orders reinstated, and some have found this is difficult to accomplish, as manufacturers have been able to make good these cancellations with orders from new quarters. The demand is somewhat different from that of last year at this time, in that there are more calls for medium goods than for the finer grades.

Many mills which are working on fall lines are not disposed to turn their machinery on spring and summer goods, although they may be in greater demand at present.

The position of hosiery is about the same as that relating to underwear, in that buyers are not interested particularly in fall supplies, but more in those for current business. Tan hosiery for spring and summer wear is now being bought freely, and many believe that tan goods will be the leading thing before the season is over, as there has been quite a heavy run on all shades, and those in popular demand are difficult to obtain.

At a meeting of the American Knit Goods Manufacturers' Association in Philadelphia, last month, the members were unanimously in favor of the net weight basis for the buying of yarn, and a committee was appointed to confer on this subject with yarn manufacturers. Upon this list appear the names of Harry G. Querns, of Querns Bros., Philadelphia; J. W. Landenberger, of J. W. Landenberger & Company, Philadelphia; and Edward Blood, of J. Blood & Bro., Philadelphia. As will be noted in our cotton yarn market report the largest New England producers of cotton yarn have signed an agreement whereby they refuse to sell on a net weight basis, but adhere to the present rule of two per cent allowance. Among the mills which have signed are: The New England Cotton Yarn Company, Lawrence & Company, Catlin & Company, and Harding, Whitman and Company.

THE SOUTHERN COTTON YARN MARKET.

At the time of our last report the market was feeling a firmer tone on yarns, owing to comparatively large sales that were being made at that time by manufacturers. Some of these sales were consummated at prices higher than those quoted by dealers, which helped very materially in sustaining the market.

The low prices that have prevailed during the past month have been the means of stimulating more business, although the prices on the lower numbers were somewhat firmer as a result of orders which were placed for them due to early concessions. As will be noted in our quotations below, prices are from one-half to one cent below those existing a month ago. There is a wide margin between consumers' and spinners' ideas of yarn values, which makes quotations not wholly reliable, and it is possible that they may be one-half to one cent below or above those named. There is manifested in the trade a belief that better times and consequently better prices are not far distant.

At the close of the month the market, on the whole, is easier, and dealers in a number of instances are disposing of their stock at lower prices than those quoted below; but we fail to learn that concessions thus far made have had any stimulating effect on trade. This state of affairs has its effect upon buyers, and there is a feeling that further concessions will have to be made in order to hold trade. The cost of the raw material seems to have but little effect upon buyers or sellers, as all depends on immediate wants and supplies. Spinners are complaining that they are unable to secure a paying price for their product, and there is some talk of a cut in wages at the mills in order that manufacturing operations may continue and a profit be realized. In regard to spinners selling on a net weight basis, as has been constantly urged upon them by buyers, the New England Cotton Yarn Company and others in the same neighborhood, have declared that they would not concede to such terms.

SOUTHERN SINGLE SKEINS.

4s to 8s	16½@17	22s	19 @19½
10s to 12s	17½@..	26s	20½@..
14s to 16s	17½@18½	30s	21 @22
20s	19 @..	40s	27 @27½

SOUTHERN TWO-PLY SKEINS.

4s to 8s	17 @18	30s	21 @21½
10s to 12s	17 @18	36s	25 @..
14s	17½@18	40s	27 @28½
18s	18 @18½	50s	40 @..
20s	19 @19½	60s	50 @..
24s	19½@20	3-ply 8s upholstery	18 @..
26s	20½@..	4-ply 9s upholstery	18 @..

SOUTHERN SINGLE CHAIN WARPS.

8s to 10s	16½@17	22s	19 @..
12s	17½@..	26s	20½@21
14s	17½@18	30s	21½@..
16s	18 @18½	40s	26 @27
20s	19 @19½		

SOUTHERN TWO-PLY CHAIN WARPS, ETC.

8s to 10s	17½@18	26s	21 @..
12s to 14s	17½@18½	30s	21 @22
16s	18½@..	40s	27 @28
20s	19 @20	50s	41 @42
24s	20 @20½		

SOUTHERN FRAME PEELER CONES.

8s	17½@18	20s	21 @..
10s	18½@18½	22s	21 @21¼
11s	18½@18½	24s	22 @..
12s	18¾@..	26s	22 @23
14s	19 @..	30s	22¾@23
16s	19½@..	40s	23¾@..
18s	20 @20¼		

SOUTHERN COTTON MILL STOCKS.

Quotations by F. C. Abbott & Co., Charlotte, N. C.

	Bid	Asked.
Aiken Mfg. Co.	85	91
American Spinning	140	148
Arkwright Mills	112	--
Arlington	165	--
Avondale	--	--
Augusta, Ga.	--	74
Bonnie	--	126
Bloomfield	--	125
Brandon Cotton Mills	125	135
Brookside	--	151
Capitol City, pref	--	96
Chadwick, N. C., pref.	--	--
Chadwick, N. C., com.	--	--
Clara	130	--
Clover	150	--
Clinton	150	--
Clifton, pref	--	103
Cliffside	160	--
Chiquola Cot. Mills	120	125
Cherokee Mfg. Co.	150	--
Converse	112	117
Dallas Mfg. Co., Ala.	--	100
Dillon	85	--
Efird, N. C.	130	--
Elmira, pref	100	101
Eagle & Phoenix	135	137½
Easley	130	155
Edenton, N. C.	140	--
Exposition	--	--
Fairfield	79	84½
Florence, N. C.	--	136
Gaffney Mfg. Co	82	83
Gaston	--	111
Gainesville	50	57
Gibson	100	101
Graniteville, S. C.	160	165
Gray Mfg. Co.	125	--
Grendel	--	119
Greenwood	97	--
Highland Park	170	175
Hartsville, pref	100	--
Hartsville	120	--
Inman Mills, S. C., pref.	97	--
Kesler	135	--

	Bid	Asked.
Jno. P. King Mfg. Co.	95	99
Lanaster, com	115	--
Lanett	110	111
Langley Mfg. Co	96	--
Linden, N. C.	--	125
Limestone	140	151
Loray, pref 1901	--	98
Lowell	190	--
Mooresville, N. C.	--	136
Lumberton	--	201
Mills Mfg. Co., pref.	105	--
Modena Mills	130	--
Mollohon	109	--
Monarch, S. C.	100	104
Newberry	120	--
Nakomis, N. C.	150	156
Olympia, 1st	70	71
Ozark	--	151
Patterson	130	150
Piedmont Mfg. Co.	172	--
Pelzer	169	--
Pell City, com.	--	95
Pell City, pref.	100	--
Saxon	124	--
Sibley, Ga.	61	65
Social Circle	103	104
Spartan Mills	146	--
Springstein	90	--
Statesville Cotton Mills	102	--
Trenton, N. C.	160	--
Tryon, N. C.	121	142
Tuscarora	115	--
Tucapau, S. C.	200	210
Toxaway	94	--
Union Buffalo, 1st pref.	67	70
Union Buffalo, 2d pref.	24	28
Union Buffalo, 1st pref.	--	--
Victor Mills, S. C.	--	128½
Warren Mfg. Co.	90	93
Washington Mills	--	26
Washington Mills, pref.	--	112
Watts	109	119

	Bid	Asked.
Ware Shoals	--	91
Whitney	--	125
Wiscassett	136	--
Woodside	105	--
Woodruff	130	--
Williamston	109	--

NEW ENGLAND MILL STOCK

	Asked.	Sales
American Linen Co.	103	--
Cornell Mills	--	150
Flint Mills	109	--
Laurel Lake Mills	127½	125
Mechanics' Mills	100	--
Weetamoe Mills	90	86
Nonquitt Spinning Co.	95	100
Pierce Mfg. Co.	300	304
Soule Mill	128	--
Amory	--	176½
Amoskeag Mfg. Co.	--	235
Arlington Mills	130	130
Appleton Co.	--	130½
Boston Mfg. Co. (new)	--	46½
Boston Duck Co.	--	1275
Boott Cotton Mills	--	25¼
Cabot Cotton Mills	--	70
Cocheco (N. H.)	--	205
Chicopee Mfg. Co.	--	100⅜
Continental Mills	--	62
Dwight (Mass.)	--	1177½
Edwards	--	115¼
Essex Co.	--	135
Everett (Mass.)	--	132½
Naumkeag Steam Cotton	--	90
New Eng. Cot. Yarn pref	--	87
Nashua	--	700
Osborn Mills	--	100
Pacific (Mass.)	--	2700
Pepperell (Me.)	--	280
Pemberton	--	59
Tremont & Suffolk	--	87¼

The preeminence of the French city of Calais as a lace center is chiefly due to the cleverness of its lace makers.

The expulsion from membership in the unions of any men who had been guilty of outrages of one kind or another, against the peace of the community or the rights of their fellow-citizens would secure for the unions the respect and sympathy of the community, and would greatly further the best interests of organized labor.

The machines now in use in the Nottingham, Eng., lace industry are the Levers, lace curtain, plain net (all based on Heathcoat's invention, with Levers's improvements), and warp lace (an adaptation of the knitting machine).

NEW MACHINERY AND TRADE NOTES

FIREPROOF OIL STORAGE.

Those mill owners who have worried over the expenses, annoyances and dangers of the ordinary inefficient method of storing and handling their oils will be interested in the oil storage system which has just been installed at The Patterson and Cannon Mills at Kanapolis, near Concord, North Carolina.

This system absolutely eliminates the possibility of fire starting from the oil; prevents the waste or loss of even the smallest quantity; and greatly reduces the cost of the labor involved in handling the oil. Thus, it lowers expenses by reducing the oil bills, the labor item and the cost of insurance.

When it is stated that the entire oil supply for three distinctly separate mills is stored in one vault located conveniently to a railway siding, and that the oils are drawn wherever desired in each of the mills, only a vague idea of the advantages of this system may be gained. The fact that the only oil in any of the buildings is that which is in actual use is convincing evidence of the safety from fire which is afforded. Should a fire start from any other cause than oil, it is absolutely impossible for that fire to get to the oil and thus add fuel to the flames.

For storing the oils there are provided three cylindrical tanks constructed of heavy galvanized steel, and placed in a concrete oil-pit located beside the railway siding. For filling the tanks, there are provided fill-pipes which extend up to the floor above and which terminate in fill-boxes which set flush with the floor, protecting the pipe. The barrels in which the oil is received are rolled from the cars and emptied by gravity directly into the tank. It has been proven by experts that when left in the barrels for only a few days, from two to five per cent. of the oil is soaked up and irrecoverably lost to the consumer. As the tanks provided are of ample storage capacity, the oil is transferred immediately upon its receipt, thus doing away with this loss.

The oils are drawn to the most convenient points inside

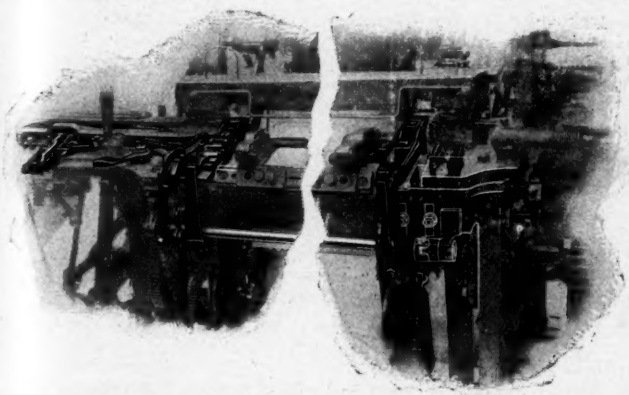
the mills by means of Bowser Long Distance Self-measuring Pumps.

With these pumps, if a gallon or any smaller quantity of oil is wanted, it is only necessary to set the quantity lever to the amount desired and give one short stroke of the handle. Instantly just the quantity wanted is pumped directly into the oiler, or can, and since the oil is also transferred from the barrels to the storage tank without exposing it to the air, the result is oil that is absolutely free from dust, grit or other contamination.

This system was manufactured and installed by S. F. Bowser & Company, Inc., Fort Wayne, Ind., who have been constructing oil handling apparatus for the past twenty-three years. The advantages of the Bowser System over the ordinary methods of oil storage, may be summarized as safety, convenience, economy.

THE DOUBLE FORK.

In the attempt of the Draper Co., Hopedale, Mass., to produce perfect cloth on automatic looms they found that one fork on one side of the cloth could not protect against all contingencies where minor defects assumed importance in view of the uses for which the goods were intended. Two forks, they claim, can prevent thin places by governing the take-up from either side of the cloth, detecting absence of filling as soon as it is apparent by the shuttle leaving the cloth without laying filling. Two forks also provide protection against any error in working of either fork singly.



The accompanying cut shows the double fork on a feeler loom, the parts in black relief being feeler, (starting at left) left fork, right fork and feeler thread cutter. This combination can be set to change a bobbin on breakage of weft or stop the loom as desired. The present mechanism is much simplified as compared with their earlier devices for the same purpose and is giving great satisfaction wherever used.

THE G. DROUVE COMPANY, Bridgeport, Conn., at the annual meeting of their directors, held February 3, elected G. Drouve, president and treasurer, and William V. Dee, secretary. Mr. Dee, who recently resigned from the *Railway Age* to take an interest in the company, has been appointed general sales manager. The company manufactures the "anti-pluvius" skylight of which 125,000 square feet have been installed on the Hoboken Terminal of the Delaware, Lackawanna and Western Railroad, and the "Lovell Window Operating Device" now used in the shops of the N. Y. C. & H. R. R. R. Co., Harmon, N. Y., the D. L. & W. R. R. Co., Scranton, Penn., and a number of others, also the "Drouve Ventilators," drying stoves, etc.

CHARLOTTE TUBE COMPANY is now ready to place Dr. M. A. Bland's patent compressed fiber bobbins on the market on a commercial scale. For the past several years Dr. Bland has been working on his invention, which he felt assured would be a great thing for the cotton manufacturing industry if only he could perfect it. This he has done and now the "compressed fiber bobbin" is a surety, having passed the experimental stage and being recognized by experts as a device of great worth. This bobbin is designed for use in place of the wooden bobbin. It has the advantage of being lighter, and less liable to split or warp than the wooden bobbins, more uniform in size and wear and do not cost any more than the old ones.

THE POWER SPECIALTY COMPANY, New York City, manufacturers of the Foster patent steam superheater, has secured among recent contracts the following, covering the installation of this superheater in the boilers indicated. Home Electric Light & Steam Heating Co., Tyrone, Penn., 840 H. P. in Heine boilers; Torresdale Filtration Plant, Philadelphia (second order) 900 H. P. in Heine boilers; Western Clock Manufacturing Co., LaSalle, Ill., (second order) 300 H. P. in return tubular boilers; Bernheimer & Schwartz Brewing Co., New York City, 1,900 H. P. in Heine boilers; Garden City Company, Garden City, L. I., 200 H. P. in return tubular boilers; National Sugar Refining Company, Yonkers, N. Y., 1,134 H. P. in B. and W. boilers. It has also sold these superheaters of the independently fired type to the New Jersey Zinc Company, University of West Virginia, Abendroth & Root Manufacturing Company, and Seacoast Canning Company.

This latter company has within the past year equipped seven of its plants with three superheaters, the same being installed in return tubular type of boilers.

STUART W. CRAMER COMPANY. Charlotte, N. C. This recently incorporated company met last month and organized with the election of Stuart W. Cramer, president and treasurer, John T. Cramer, vice-president, John C. Watson, secretary, and William B. Hodge, manager. This company has an authorized capital stock of $100,000 of which $25,000 has been paid in. The company is to make a specialty of the manufacture of air conditioners and humidifiers for air moistening, air cleansing, and the ventilation of factories and other buildings. The principal office and manufacturing shop will be located in Charlotte. The engineering and contracting organization of Stuart W. Cramer will operate with the new company in the sale of its products.

THE EUREKA FIRE HOSE MANUFACTURING COMPANY, New York. At the annual meeting of the stockholders of this company the following were elected directors for the current year. B. L. Stowe, N. F. McKeon, and G. A. Wies. The officers of the company for the current year are as follows: B. L. Stowe, president; I. B. Markey, vice-president; G. A. Wies, vice-president and treasurer; N. F. McKeon, secretary; W. F. Wies, assistant treasurer; W. F. Volz, assistant secretary.

DANIEL SHAFER. Mr. Shafer, one of the best known salesmen and engineers in the South, died from an attack of pneumonia, January 24th, at the Nashville Hotel, Nashville, Tenn. He had been associated for the past three years with Allis-Chalmers Company, Milwaukee, Wis.

ALBERT BAECHTOLD, superintendent of the Chinnabee Cotton Mills, Talladega, Alabama, has an interest in the Selecta Hosiery Mills of the same place, and will take charge of the latter mills as general manager and buyer at once.

EUREKA PACKING COMPANY, NEW YORK. This company has sent out to the trade a unique and convenient bill file for hanging against the wall or desk, and undoubtedly will be sent upon application to any one. This company makes packing in six styles.

FRED. FRANKE & COMPANY, 314 Preston St., Louisville, Ky. This company has issued its 1908 catalogue of improved baling presses for all purposes. One of their latest presses is what they term their clothing baling press, which, it is said, will save clothing manufacturers hundreds of dollars. Their presses are adapted for such purposes as the baling of rags, waste paper, rubber, copper, metals, hay, etc., etc. Those desiring this kind of a press should write for a catalogue.

MURRAY IRON WORKS COMPANY, Burlington, Iowa. This company has issued a valuable catalogue of a more or less technical nature relating to the engines built by it. This company is also the builder of air compressors, pumping engines, tubular, water tube and internal-furnace boilers, feed-water heaters, and complete power plants.

CASSELLA COLOR COMPANY, New York. This company has just issued a color card relating to its Diamine Bengal Blue G and R. This dye comes into consideration for direct dyeing and also for an after treatment with sulphate of copper and bichromate of potash. It is well suited for producing dark blue shades on loose cotton, yarn and piece goods.

HANDBOOK OF SOUTH CAROLINA. The State Department of Agriculture, Commerce and Immigration, Columbia, S. C. has issued a hand-book of South Carolina fully illustrated, with notes, etc., of the resources, institutions and industries of the State. This is a summary of the statistics of agriculture, manufacture, geology and physiography, minerals and mining, education, transportation, commerce, government, etc.

THE BOOMER AND BOCHERT PRESS COMPANY, Syracuse, N. Y. The 1908 catalogue of this company has just been received, giving a general idea of the style and prices of its presses, many of which have been built for the last thirty years. This company makes knuckle-joint presses, power-screw presses, hydraulic presses, and special presses for special work.

The well written advertisement requires the use of absolutely simple language. And simple language is the language most difficult to write.

MILL NEWS.

Notices of mill projects, additions or improvements are solicited for this department.

ALABAMA.

HUNTSVILLE. Abingdon Mills are said to be contemplating addition of new spinning machinery to their present equipment of 20,000 spindles and 400 looms.

OXFORD. The Planters Manufacturing Company, making cotton cordage, expects to have arrangements made to increase its capacity three times and to make other improvements.

SILURIA. The Siluria Cotton Mills have been incorporated with a capital of $250,000 with E. J. Smyer, president; W. T. Poe, vice-president and B. A. Thompson, secretary. This corporation is a continuation of the Siluria Cotton Mill Company, operating 10,336 spindles and 300 looms.

CALIFORNIA.

LOS ANGELES. Among our mill news items in January was one to the effect that an Alabama manufacturer is backing a movement in this place to establish a cotton mill to give employment to 400 operatives in the manufacture of cotton grown in the Imperial Valley of this State, where, however, the staple is not likely to be raised in sufficient quantities for commercial purposes for a number of years. The scheme may not be realized for sometime to come. As reports have it, the prime mover is Dennis Howart, associated with S. A. Crozer & Son, Upland, Penn., and also a stockholder in the Woodstock Cotton Mills, Anniston, Ala. Reports from Los Angeles come to us to the effect that Mr. Howart has been in that city for the past three or four months, and has succeeded in securing the backing of several well-known capitalists, one of whom is A. H. Beach. The Chamber of Commerce of this city has signified its willingness to do anything in its power to establish the new industry. The plan is to erect a mill for the manufacture of crash, toweling, ticking, twine and kindred products.

NEW JERSEY.

NEWARK. The Guarantee Hosiery Mills, have been incorporated with a capital of $25,000. E. G. Gifford is one of the incorporators.

GEORGIA.

ALBANY. S. D. Pickett and others are to organize a company to build a 10,000 spindle mill for cotton yarn to be driven by electricity. J. E. Sirrine Greenville, S. C. is the engineer in charge.

BLAKELY. It is reported that C. M. Deal is interested in a plan for the organization of a company to erect a cotton mill.

CEDARTOWN. The Southern Hosiery Mills have been incorporated with a capital of $20,000 for the manufacture of cotton hosiery. J. W. Ferguson and others are interested.

COVINGTON. The Covington Mills are soon to install 1,000 more spindles which will bring their equipment up to 18,000 spindles and 400 looms.

JESUP. The Goose Creek Railway & Power Manufacturing Company, have been incorporated with a capital of $250,000 with the privilege of increasing it to $500,000, and plans to build a cotton mill to be operated by electricity. D. G. Zeigler of Columbia, S. C., is the architect in charge.

NEWNAN. The Newnan Cotton Mills are renewing their charter with the privilege of increasing their capital to $2,500,000, the capital is now $500,000.

ILLINOIS.

CHICAGO. The Western Knitting Mills have increased their capital from $30,000 to $50,000.

SPRINGFIELD. The Hinman Knitting Company, has been incorporated with a capital of $20,000 with C. A. Hinman as one of the incorporators.

NORTH CAROLINA.

CEDAR FALLS. The Cedar Falls Manufacturing Company has been incorporated with a capital of $125,000, for the manufacture of cotton goods. L. T. McAllister is one of the incorporators.

CONCORD. The Edgemere Manufacturing Company, a cotton cloth concern, has increased its capital from $25,000 to $100,000.

DREXEL. It is reported that D. B. Mull is contemplating to establish a cotton-hosiery mill at that place.

HIGH SHOALS. It is said that the High Shoals Company, has contracted for considerable additional machinery and that it is to supplement its present water power with electric power obtained from the Southern Power Company.

MORGANTON. The Alpine Cotton Mills, making cotton yarns, will build an addition of brick, 75 feet long, for packing and storing.

NEW YORK.

NEW YORK CITY. The Hecht Hosiery and Underwear Company, has been incorporated with a capital of $10,000 with Jacob and Solomon Hecht among the directors.

UTICA. The United Knit Underwear Company, has been incorporated with a capital of $25,000. Ernest W. Robinson can give information.

OKLAHOMA.

HOOKER. It is said that the Farmers' Union is forming a company to build a cotton mill here.

OKLAHOMA CITY. The Chamber of Commerce of this place is interested in the completion of arrangements for organizing a company to build a cotton mill here.

PENNSYLVANIA.

GERMANTOWN. Gibson & Stern, manufacturers of lace and underwear have increased their capital stock from $60,000 to $110,000 of which amount $100,000 is fully subscribed and paid into the treasury.

GERMANTOWN. The Charter Hosiery Company's mill that was recently destroyed by fire will install new machinery and start up very soon.

PHILADELPHIA. The Wallace-Wilson Hosiery Mill is now operating the Darby Mill and Carlisle Mill as their Mill No. 2.

SOUTH CAROLINA.

CHARLESTON. The new waste mill in this place, referred to in our February issue, is to be known as the Charleston Cotton Mills to be capitalized at $200,000. A site has been purchased, and about 30,000,000 pounds of waste are available from surrounding mills. The product will be cotton wadding, rope, twine and blankets and other like articles. George A. Waggener can furnish information.

BLACKSBURG. A new concern known as the Blacksburg Mills to manufacture cotton cloth, is to erect a main building of 150x200 feet, warehouse and boiler room, all to have a total floor space of 32,200 square feet. J. E. Sirrine of Greenville, S. C., is the engineer in charge, 5,000 spindles and 128 looms will be placed into position. G. L. Anderson, Williamston, is president.

PENDLETON. It is said that the Pendleton Cotton Mills have awarded a contract for 8,000 spindle additional to present equipment.

ROCK HILL. We noticed in our January issue that W. W. Moore is interested in the organization of a cotton mill in this place. This concern will be known as the Wymojo Yarn Mills, and will be one story high, monitor roof with a capacity for 10,000 spindles, but only 5,000 will be installed at first. It will be run by electricity. Products 24's to 30's yarns.

SPARTANBURG. Elisha Bomar is interested in the formation of a company to build a 10,000-spindle cotton mill.

TRYON. The Pacolet Finishing Company has been incorporated with a capital of $125,000 by J. F. Wilcox and others.

TENNESSEE.

MADISONVILLE. The Madisonville Knitting Mills have been incorporated with a capital of $15,000, and machinery will be installed to have a daily capacity of 250 dozen pairs of women's hose. R. C. Kefauver is president.

OZONE. L. H. Stone and others propose to establish a mill for making hosiery and underwear. Machinery is wanted.

TEXAS.

FORT WORTH. The Farmers' Union, D. J. Neill, president, expects to complete arrangements for the organization of the $500,000 cotton mill referred to in our February issue.

FAILURE OF A LARGE COTTON WAREHOUSE.

The creditors of the Farmers & Bankers Warehouse Building Association have filed a petition in involuntary bankruptcy against the concern. The liabilities exceed $500,000, and the assets are an uncertain amount. Involved in the bankruptcy proceedings are cotton and cotton warehouses in Texas, Louisiana, Mississippi, Arkansas and some sections of Oklahoma, all of which contain more or less cotton held for higher prices. The creditors in the main are banks and manufacturing concerns in large cities. The manager, David H. Shapira, is under indictment for misappropriating the cotton of farmers which was given to him, and with evident showing of other shortages. The policy of shipping cotton to Liverpool may be said to have been nipped in the bud. According to the accounts received by us, the farmers of Oklahoma, and many in Texas, have not been able to find their cotton, and have no evidence of where it has gone.

We have been informed through various sources that the Association did very little with financing cotton, and that it is too early to tell what effect the failure will have on this special line of business. One cotton factor, prominent in his section, writes us that the failure of this concern is likely to affect the building of warehouses for the present, provided any of the loss actually falls on the farmers, and that the bankers and merchants are not likely to take so freely, hereafter, warehouse certificates, unless they make more careful inquiries into the concern that issues them.

COTTON FACTORIES IN PERU.

The following are the names of the cotton factories in Peru, which have been furnished us by good authority at Callao.

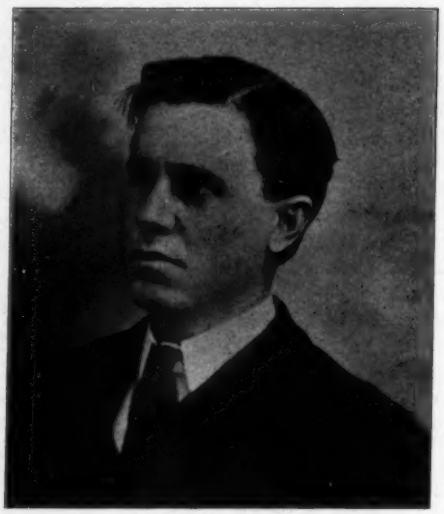
Peruvian Cotton Manufacturing Co., Vitarte, Lima.
Inca Cotton Factory, Lima.
El Progresso, cotton factory, Lima.
La Providencia, cotton factory, Lima.
La Victoria, cotton factory, Lima.
Fabrica de Tejidos de Algodon, Arequipa.
Ica Cotton Manufactory, Ica.

The approximate output of the lace industry in Calais, Caudry and St. Quentin is about $20,000,000. The industry in the last three years has increased more than 50 per cent in Calais.

Advertising is part of the most important work in the world. That work today is distribution.

JOHN A. SHINN.

The subject of this sketch was born at Concord, N. C., August 10th 1869. At the age of fifteen he began his cotton mill career, accepting a position with the Odell Manufacturing Co., in his home town of Concord, where he worked in all of the various departments, laying a broad foundation for a successful mill manager which he has since attained. After having spent four years with the above concern, he went to Rock Hill, S. C., in 1887, where he accepted a position as boss carder for the Rock Hill Cotton Mill. Mr. Shinn was successful in the management of the carding department from the very start, and after three years service he resigned to accept a more lucrative position as carder and spinner for the Patterson Manufacturing Company, China Grove, N. C.



JOHN A. SHINN.

He stayed at China Grove four years, proving himself a spinner as well as a carder, and gained some reputation as a good manager. In 1898, he was offered and accepted the position of superintendent for the Victoria Cotton Mills of Rock Hill, S. C.

Mr. Shinn's former work at Rock Hill stood him in good stead at this time, and he also formed other affiliations in this town which made his new home more attractive. In the spring of 1890, he and Miss Lizzie Gordon were married.

As superintendent for the Victoria Cotton Mills Mr. Shinn made a wonderful success, raising the mill from an almost bankrupt concern, to one of the most modern and best paying pieces of cotton mill properties in the State. It required seven years of hard work and devotion to duty to complete his record at this place.

Having gained a wide reputation as a successful superintendent Mr. Shinn was, in the early spring of 1905, selected to superintend the Central Mills of Sylacauga, Alabama, which position he now holds. These mills are among the largest in this country devoted to the manufacture of high-grade hosiery yarns, containing 25,536 spindles, with a reputation on their product that is not surpassed anywhere.

Mr. Shinn is a man of persistency and his example could well be followed by any young man seeking to get on in the cotton manufacturing business.

Mr. and Mrs. Shinn are the parents of six children—five son's and one daughter—the eldest being at present a student in the Alabama Polytechnic Institute, Auburn, Ala. Mr. Shinn is a Mason of high standing—a Shriner, member of Knights of Pythias, Woodmen of the World, and other orders, also an elder in the Presbyterian Church.

AMONG SUPERINTENDENTS, OVERSEERS AND OTHERS.

We shall be pleased to receive notices of any changes among agents, superintendents, and overseers in textile mills.

J. C. Keller is now overseer of carding and spinning for the Lula Manufacturing Co., Kings Mountain, N. C.

E. N. Tart has been promoted to the position of superintendent of carding and spinning for the German-American Co., Draper, N. C.

B. F. Nuttall is now overseer of the cotton department of the Standard Knitting Mills, Knoxville, Tenn.

T. B. Howard has been given the position of overseer of carding and spinning in the Natchez Cotton Millls, Natchez, Miss.

B. F. Houston is now superintendent of the Kinston Cotton Mills, Kinston, N. C.

J. F. Tomblin has been made superintendent of the Knoxville Knitting Mills, Knoxville, Tenn.

P. C. Bryan is now overseer of weaving at the Anchor Duck Mills, Rome, Ga.

L. W. Evans has accepted the position as overseer of carding at the Maple Cotton Mills, Dillon, S. C.

W. B. Wood is now overseer of dyeing at the Marlboro Cotton Mills, No. 3, McColl, S. C.

B. P. DuBois paymaster in the United States navy, who has been on duty in the bureau of chemistry, department of agriculture, Washington, has been ordered from that city to Philadelphia to attend a course of instruction at the Philadelphia Textile School.

William Smith, of Williamantic, has been made superintendent of the Pequot Mills, Montville, Conn.

Walter H. Armstrong, for eight years overseer of the spinning department of the Lyman Mills, Holyoke, Mass., has been appointed superintendent of these mills.

A. L. Hilton has taken the position of overseer of carding and spinning for the Mankato Mills Company, Mankato, Minn.

George Y. Busbee, of Warrensville, S. C., has taken charge of the weaving of the Pell City Manufacturing Company, Pell City, Ala.

J. F. Capps is superintendent of the Longhurst Cotton Mills, Rockboro, N. C.

J. A. Hinson is now overseer of carding for the Chadwick Manufacturing Co., Charlotte, N. C.

W. B. Biggers is now overseer of weaving for the Gastonia Cotton Manufacturing Co., Gastonia, N. C.

T. S. Haskell has been chosen superintendent and manager of the C. F. Boyer's cotton mills, Newport, Tenn.

G. C. League is overseer of weaving for the Cherokee Falls Manufacturing Company, Cherokee Falls, S. C.

Advertising is to industry, to manufacture, what the electric light bulb is to the steam engine and to the dynamo in the electric light power house. The steam engine and the dynamo do the work, but you only know what they do by the light as shown in the electric bulb.